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SEPTEMBER 1993

Macworld

THE MACINTOSH® MAGAZINE

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Newton

The Start of Something Big?

PLUS 3 NEW MACS

Mac LC 520

PAGE 108

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Quadra 840AV

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3 NEW SECTIONS

Graphics, At Work, Networks

Top 46 Products

ANNUAL WORLD-CLASS AWARDS

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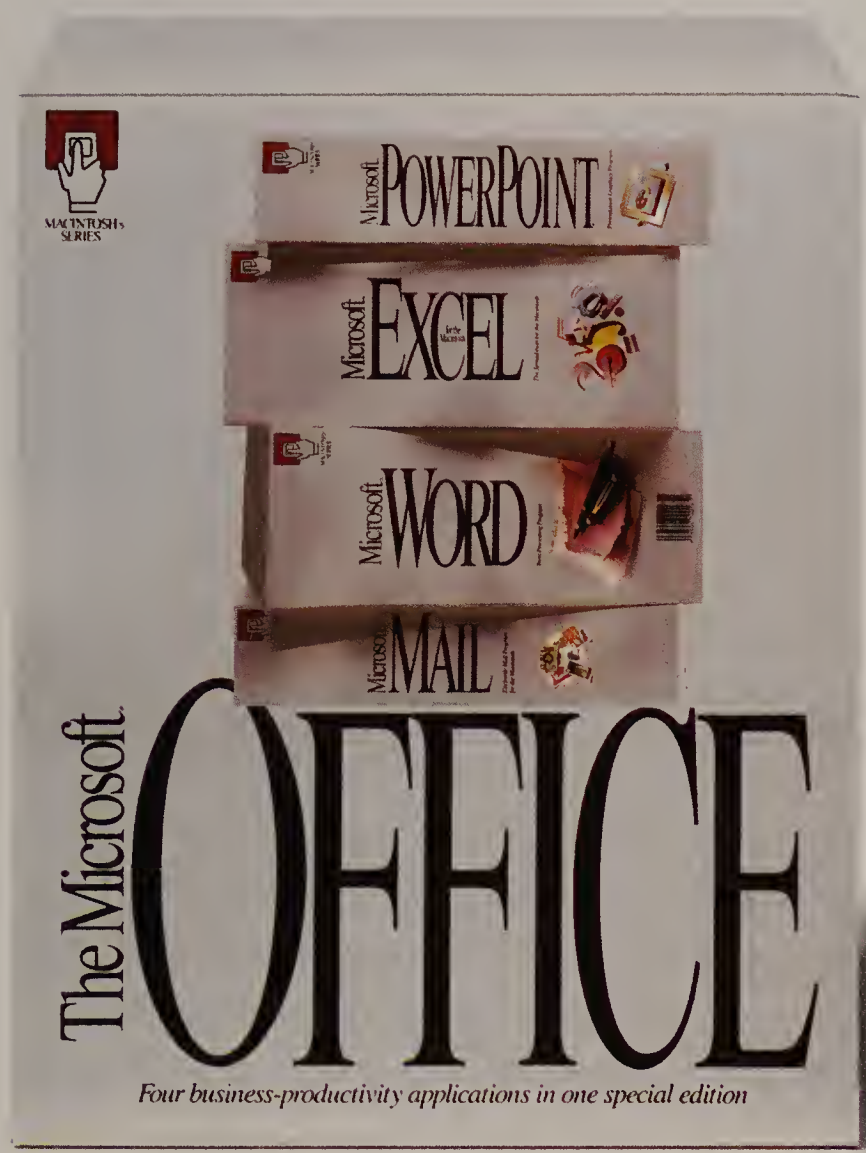

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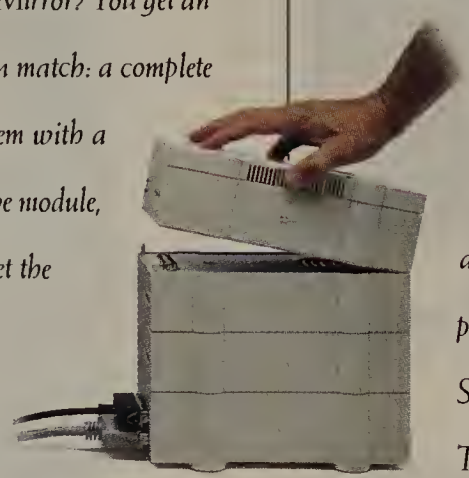

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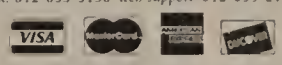

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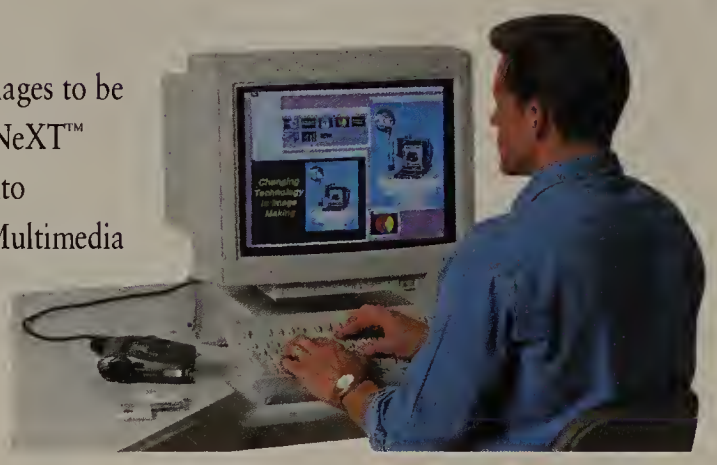

10:45
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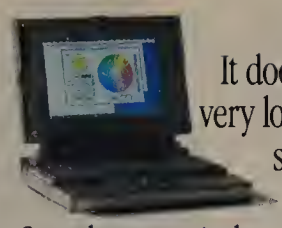

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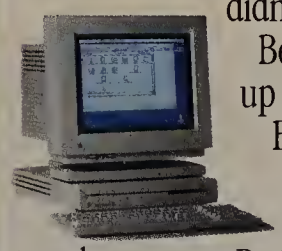

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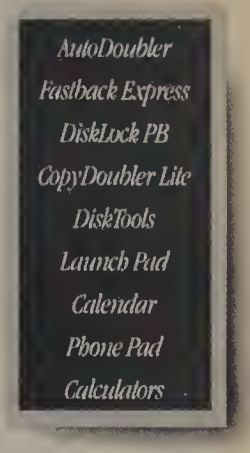

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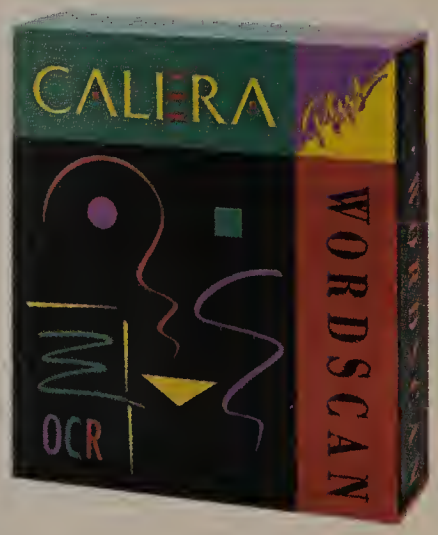

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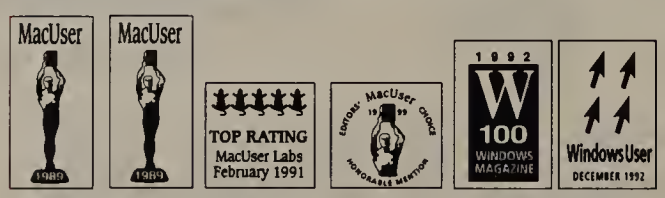

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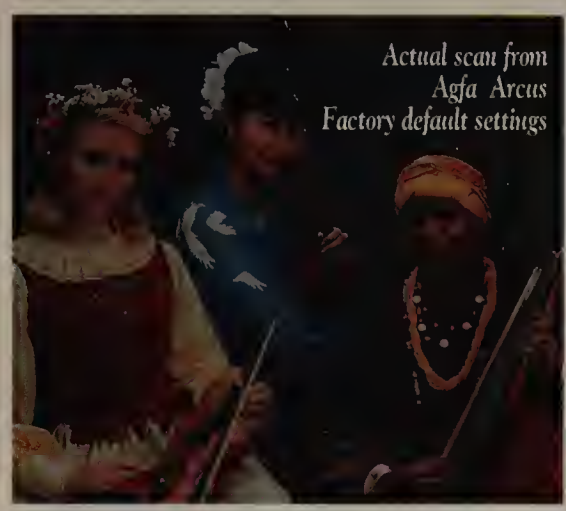

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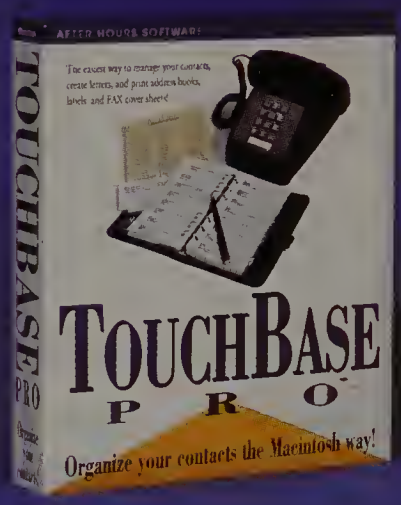

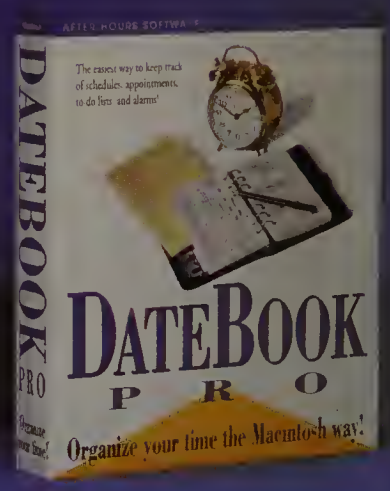

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STATE OF THE MAC

BY ADRIAN MELLO

Evolving Macworld

More information, easier to use

NOTICE ANYTHING DIFFERENT? Take a look at the cover. Our bold new logo heralds a collection of improvements introduced in this issue. The last few years have witnessed tremendous changes at Apple and in the developer community surrounding it. Ultimately, these changes affect not only the computer industry but our readers as well, as you attempt to make sense of the waves of new product offerings and price changes washing over you. There are now an unprecedented number of Macintosh models, and to remain competitive with Windows and DOS PCs, Apple has been cutting prices rapidly. Throughout the industry, prices are dropping on a regular basis, and vendors must put out more-capable versions of their products in ever-shorter development periods. We at *Macworld* know that the demands of your work have also become more intense, and you have less time than ever to keep up with the deluge of information about Macintosh hardware and software.

Over the past year we have been concentrating on how to give you the best possible magazine to meet your Macintosh computing needs. Several months ago I asked you what changes you would like to see in *Macworld*, and I was rewarded with many excellent ideas. From all the responses, one thing was clear: the most important reason people turn to *Macworld* is to get product guidance. You want to know which of the many products available will work for you and which provide the best value.

In this issue, *Macworld* introduces many improvements to help you stay on top of the changing product and technology maze. For example, a new buying reference section called *Buyers' Tools* points you in the right direction when you need to know what product to buy. We're also devoting twice as much space to news to keep you up-to-date on new products and key technological developments. And we're unveiling three major new sections that focus on key areas of reader interest: graphics and publishing; networking and communications; and general productivity applications such as word processing, spreadsheets, and database management. Finally, we've made all this information easy to find by organizing it according to *your* interests so you can save time and work as effectively as possible.

Our bolder, more engaging design helps you navigate the large increase in editorial pages. In addition to telling you what's more interesting about the Mac, we show you. We've added more illustrations and photographs to support our editorial content. Plus, *Macworld* remains a showcase for the best artwork being produced on the Macintosh today. Even our new logo reflects our new direction: we've exchanged the Garamond typeface for Aurora, opting for its bolder, more contemporary character.

GLENN MITSUI/STUDIO MD

Product Reviews

Above all, *Macworld*'s primary purpose is to help our readers make the best, educated buying decisions. *Macworld* continues to provide a greater number of in-depth stand-alone and comparative reviews of Macintosh-related products than any other magazine. To underscore their importance, we've moved the reviews to the front of the magazine so you can find them faster. A summary at the top of each review spells out each product's pros and cons so you can quickly assess whether or not a product is a good match for your work. Our star ratings and our painstaking review process yield measured and objective judgments that you can trust when it comes time to part with your hard-earned cash.

Whether it's hard drives, monitors, or utilities, *Macworld* points out the pick of the litter with thorough product comparisons and award-winning feature articles. Macworld Lab is expanding to meet the demands of testing the ever-growing base of Macintosh products. To help you understand the reasoning behind our recommendations, our laboratory articles now present even more technical information. "Behind Our Tests," a sidebar included in each lab article, explains Macworld Lab's test methodology. In future issues we will introduce "Tech Notes"—an insider's perspective on the technical issues uncovered by our lab staff.

News

Macintosh products and technology change more quickly all the time. *Macworld* helps you keep pace with these changes by providing more news than ever before on products, technological developments, and industry trends. *MacBulletin*, *News*, and *New Products* are now united in a single redesigned *News* section, which appears at the front of the magazine. *News* makes it extremely easy to stay informed on the important product developments in the Macintosh market. Also, three new sections—*Graphics*, *At Work*, and *Networks*—each start with two pages of related news to that section.

Graphics

Macworld has been long recognized for its award-winning graphics. From the magazine's inception, we've used only Macintosh-generated graphics, to demonstrate what leading illustrators can do with the

continues

Mac as a graphics tool. Now *Macworld* devotes an entire section of the magazine to graphics applications: prepress, illustration, publishing, type, rendering, and image editing, among other design-related topics. Each month the *Graphics* section will open with news stories. Every month outstanding professionals will share their tips and techniques with you in *Expert Graphics*, a column that walks you through the development of an exceptional image. In addition, the section provides feature articles on graphics-related subjects. This month we start out with two in-depth comparative reviews—one that covers drawing packages and the other on color paint programs.

At Work

While the Mac has been celebrated for its ground-breaking success in graphics and publishing, most Macintosh users continue to rely on standard productivity applications such as word processing, spreadsheets, database management, and personal organization. *Macworld*'s *At Work* section provides up-to-date information on the latest business and productivity tools for the Mac. Also, a new column called *Working Smart*, written by Jim Heid, provides practical advice on how to manage everything from manipulating large spreadsheets to orchestrating a presentation. The *At Work* section also includes Lon Poole's *Quick Tips* column, and feature articles on such topics as financial forecasting, choosing the right accounting software, and optimizing your word processing.

Networks

Many users no longer accept working on an isolated personal computer as the status quo. A third major new section called *Networks* keeps you informed of key developments in networking, electronic mail, and telecommunications. Since the Macintosh has muscled its way into the mainstream, organizations need to integrate Macs with other PCs, workstations, minicomputers, and mainframes. *Macworld*'s *Networks* section addresses a host of multiplatform issues, such as hooking Macs up to TCP/IP or NetWare. The section will include news, features, and Cary Lu's *PowerBook Notes*.

Buyers' Tools

In the back of the magazine we now offer a section of reference tools for product selection. Called *Buyers' Tools*, this section not only helps you find the best products for your work, but also saves you money by pointing out the best bargains. This section is home to *Star Ratings* (which debuted several months ago), a series of capsule judgments on more than 400 products evaluated in *Macworld*'s *Reviews* section in the past 12 months. In *Star Ratings* you will find just about everything from desktop publishing software to modems and network hardware. Also in *Buyers' Tools* is *Editors' Choice*, which compiles the results from Macworld Lab tests and other comparative reviews from the past year to steer you to the products our reviewers judged as the best in a given category, such as large-screen color monitors, optical drives, or CAD software. Finally, we've added *Streetwise Shopper*, a selection of special promotions currently offered by vendors.

Macworld has grown and benefited from the feedback our readers have given us in the past, and we welcome your opinions on our new look and our new way of doing things. After you've had a chance to look through this issue, send us a letter or an E-mail to let us know what you think. We hope you like what you see. m

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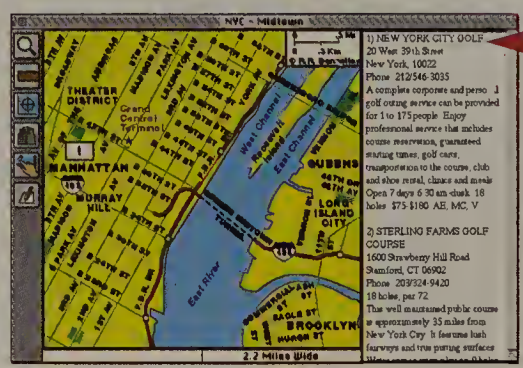

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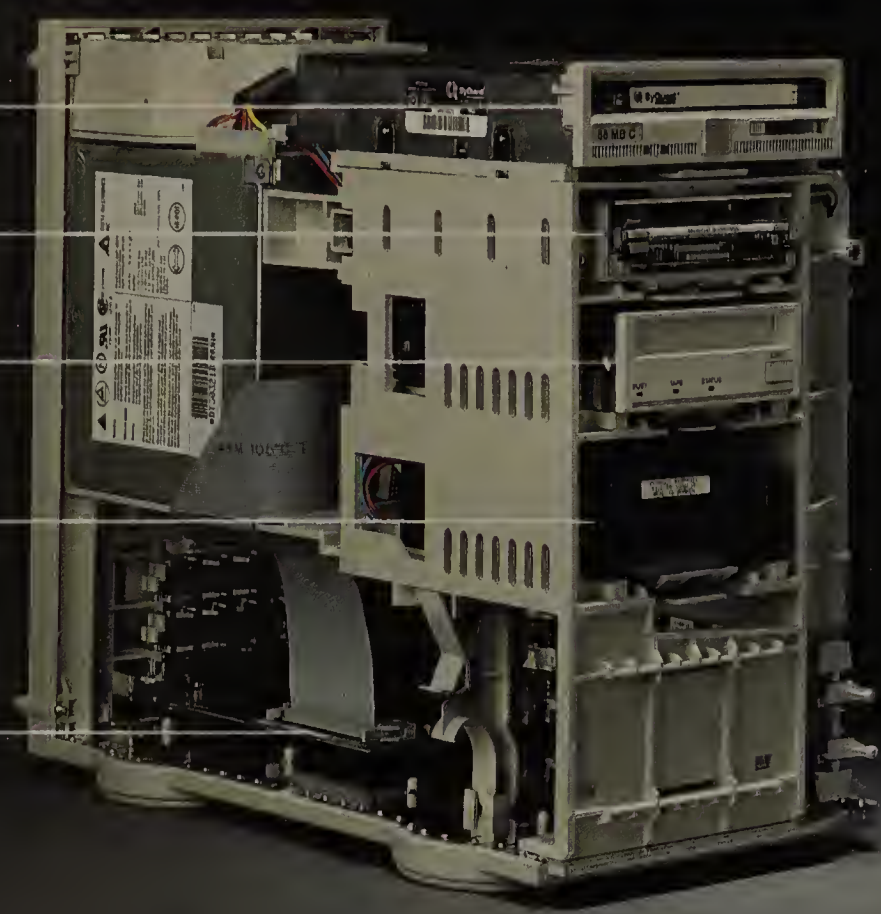

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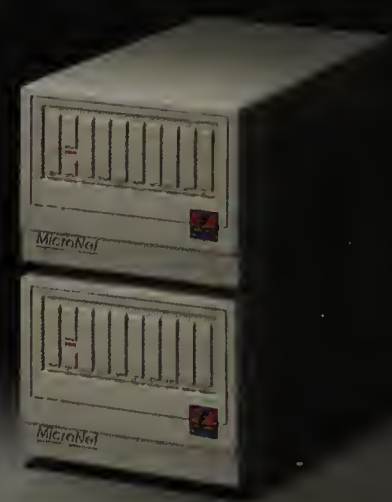

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Letters

Macworld Kicks Butt!

I KNOW THAT I'LL BE ONE OF MANY readers who will congratulate you for the outstanding "Upgrading Your Mac" special report (June 1993).

Keep up the good work.

Thomas Miller
Wilmington, Delaware

THE SIDEBAR "PUTTING TOGETHER the Ultimate Mac" (June 1993) didn't picture or account for any means of entering data. Without a keyboard and mouse, your system is useless, isn't it?

You should have included the new Apple Adjustable Keyboard and Apple Desktop Bus Mouse II ($219 and $79, respectively). While you're at it, how about adding Articulate Systems' Voice Navigator II ($699)? All this should bring your total up to $38,704.

Art Pettipas
Dallas, Texas

I AM THE PROUD OWNER OF A MUseum-quality Mac Plus with System 6.0.8, 4MB of RAM, and a 40MB hard drive. Imagine my reaction when I see Ms. Stefanac's statements to the effect that a Plus is a flawed, obsolete relic that is not worth fixing up ("Expanding a Compact Mac," June 1993). The only thing I can do, this line of reasoning goes, is go out and buy myself a brand-new Color Classic or LC III.

Well, duh! Why didn't I think of that? That's like telling someone with a 1985 Chevy that they shouldn't waste money buying new tires when it would be far better to go out and buy a brand-new BMW. Thanks for that news flash.

Most people already know that purchasing a brand-new computer is preferable to staying with their old one, so perhaps in the future you could tone down the "They have no bread? Let them eat cake" approach to upgrading.

James McCool
Westland, Michigan

WARD SCHUMAKER

"GETTING MORE FROM A MAC II" (June 1993) lumps the Performa 600 in with the IIvx and claims that a Centris 650 logic-board upgrade is available for them both. I bought a Performa 600, and according to Apple, I can't upgrade to the Centris 650. You blew it and I bought it. Let your readers know before they blow it as well.

Scott Carl
Portland, Oregon

According to Dave Limp, product manager for the Centris 650, Apple's Performa service organization is not currently set up to handle logic-board upgrades. However, Apple is looking to get an upgrade plan in place for Performa owners. Stay tuned.—Ed.

Quark Inc.: License Expired

I WAS SO OUTRAGED BY QUARK'S response to the Mitchells of Miami in the July issue that I couldn't even finish reading *Letters* (my favorite column). Perhaps the subtlety of the point requires a two-by-four between the eyes.

Software vendors have screamed long and loud that their customers don't actually purchase software, only the right to use it. But suddenly, according to Quark, software is property that the user has purchased and should be replaced by an insurance claim? Sorry, folks, but you can't have it both ways. If the user has purchased only the right to use the software, and has paid for and duly registered that right under the vendor's own rules, then I say the user retains that right until the day he dies or until the vendor cheerfully refunds the purchase price.

Three cheers for Symantec (whom I have patronized and will continue to patronize), and shame on Quark (whom I don't and won't). Now I can go back to the rest of *Letters*.

Mark Walker Rhodes
Dallas, Texas

REASONABLE CUSTOMER SUPPORT includes providing replacements for lost software and documentation for a nominal fee. Also, regarding phone support, I think the purchaser of expensive software deserves at least 15 minutes of conversation (not including time on hold) with a support person before having to pay extra money for it. I study the manuals and try to answer questions for myself, but when I can't figure it out, I think I deserve to talk to a competent support tech without being punished for it.

Tom Slocombe
Orange, California

Customer Disservice

AS THE PRESIDENT OF A SOFTWARE company, I was angered by the anonymous letter offering "suggestions from someone on the other end of the telephone" (*Letters*, June 1993). While I'm sympathetic to the stress of dealing with demanding customers, that is the job of a customer-service representative.

I would like it if all our customers registered their software, read the manual thoroughly, and had their serial numbers

continues

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CORRECTIONS

■ *In the June 1993 review of the Centris 610 and 650, references to the Apple 14-inch monitor should have been to the Performa Color Display.*

■ *The maximum hard drive transfer rate for an LC II is 1400 Kbps, not 400 Kbps ("Upgrading Your Mac," June 1993).*

■ *The June 1993 feature "Money Matters" incorrectly stated that Aatrix's Hi Finance software could automatically download stock quotes from America Online. Downloads can be imported into Hi Finance, but the program cannot be set up for this to occur automatically. Also, Dollars & Sense 5.0 is currently being sold and supported by The Software Developers Consortium, 801/288-2216.*

■ *The price of the In Focus PanelBook should have been $5995, not $59.95* (News, *July 1993).*

■ *The number for the Direct Marketing Association, listed in the sidebar "11 Easy Ways to Safeguard Your Electronic Privacy," has changed ("Privacy in Peril," July 1993). To have your name removed from mailing lists, call the DMA's customer service department at 202/347-1222.*

■ *The correct phone number for Irvine Interactive is 619/431-8860* (New Products, *July 1993).*

■ *The correct retail price for the Helix Tracker server and four clients is $439, not $739* (New Products, *August 1993).*

handy before calling tech support, but then I'd also like it if I looked like Tom Selleck. A hurried, inexperienced, confused, panicked, frustrated, or even rude customer is still *your* customer. If you can't help them, get another job—preferably with one of my competitors.

Dan Chadwick
Somerville, Massachusetts

REGARDING THOSE FACELESS voices on the other end of the phone—it's just too easy to get testy with them. Don't take potshots at the operator; put your grievance into a carefully worded letter. Who knows? Bopping the supervisors in the noggin with a written customer complaint may open their eyes to a problem that their employees have tried to communicate all along.

Erik Wegweiser
Allston, Massachusetts

PowerBook Security Leaks

IN THE JUNE 1993 *POWERBOOK NOTES* column, Cary Lu writes that PGP (Pretty Good Privacy) is "the most robust security product for the Macintosh." Unfortunately, PGP is illegal. Mr. Zimmerman, the author of PGP, has never obtained a license for the right to use our invention, the RSA Public Key Cryptosystem. We are disappointed that *Macworld*, a reputable magazine, would knowingly encourage its readers to violate our patents and intellectual-property rights.

Kurt Stammberger
Technology Marketing Manager
RSA Data Security
Redwood City, California

The encryption algorithm in question was developed and patented at MIT, and then later licensed by RSA. PGP uses the same algorithm, but Zimmerman argues that since the algorithm was developed with public (Department of Defense) moneys, it should be publicly available. RSA obviously disagrees, but its claims have never been tested in a court of law. This conflict is covered in the PGP documentation—readers must decide for themselves if they want to use PGP.—Ed.

MR. LU'S JUNE 1993 COLUMN could leave the erroneous impression that ultraSecure's additional features could "compromise security." Most security experts agree that the security of a software product is determined by the quality of the key management and the encryption algorithms used, not by how many features and options are available to the user.

Richard Born
Vice President
usrEZ Software
Irvine, California

ultraSecure's features do not compromise security; however, a user can choose among several levels of security. The manual explains the advantages and drawbacks of each choice.—Ed.

Rise of the Dead?

I ENJOYED ADRIAN MELLO'S JULY column, "The Macintosh Book of the Dead," and I empathize with the frustrated IIvx owners. Fortunately, I did not go down that path. I had my eyes on a IIvx, but Adrian's Truth 3 ("The meek perish quickly") seemed to be the active factor. The performance of the IIvx was barely equal to that of the IIci, and the price was way out of line, so I waited. It was not long before the rumors of the Centris line appeared, and I am now the proud owner of a Centris 610.

But IIvx owners should not give up hope (and should not spend $1600 for a Centris 650 upgrade). Remember the pre-

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cedent of the LC. The LC–to–LC II upgrade cost over $700, if memory serves, and offered nearly nothing in return. However, the LC–to–LC III upgrade is priced at $600 and provides a big performance boost (with the unfortunate side effect that any additional memory must be replaced). Perhaps we will see a competitively priced IIvx upgrade to a PowerPC configuration.

Larry Rosenblum
via CompuServe

Finance Article

TOM LINDEN CHOSE A POOR EXample when he explained category splitting by writing a $1000 check to MasterCard and splitting it up into 15 categories for the 15 transactions on the bill ("Money Matters," June 1993). In MacMoney, at least, those 15 individual transactions would have been entered separately into his credit card account at the time the transactions occurred. Tom would have a running record of how much he'd charged during the month. When he got the bill, MacMoney would show a $1000 balance in his MasterCard account.

He would write the $1000 check from his bank account with just one category, his credit card account. It seems Tom doesn't fully understand how the personal-financial programs work in this respect. If the other finance programs don't work this way also, MacMoney deserves special credit for doing credit the right way.

Linda Weiss
via CompuServe

Ms. Weiss is correct in writing that the best way to handle a credit card is to set up a credit card liability account. When I cited the example of splitting payment for my MasterCard into 15 different categories, I was not suggesting that was the only way, or even the best way, to handle credit card transactions. My method works well when you pay the complete balance each month and don't incur finance charges.—Tom Linden

Reviews (and Columns) Reviewed

I WAS UPSET THAT IN YOUR RECENT column on portable printers you trashed the WriteMove II from GCC Technologies (*The Desktop Critic*, June 1993). While it's true that the battery gives you less than a dozen pages, there's nothing on the market with better print quality. I can print a letter or a presentation anywhere. The only nuisance is the need for a separate 220-volt adapter when traveling abroad. GCC sells one, but why couldn't they make a 120-to-220-volt adapter like the one the PowerBook uses?

Robert Lovenheim
Los Angeles, California

We didn't really trash the WriteMove, we just fell asleep waiting for it to print.—Ed.

ACCORDING TO THE JUNE 1993 Centris 610/650 review, you can't use a Norton Utilities emergency start-up disk on the Centris machines. Any registered user of Norton Utilities can phone Symantec tech support for detailed instructions on creating a bootable System 7.1 Norton Utilities Emergency disk.

Eric Woudstra
via AppleLink

IN STEVE ROTH'S REVIEW OF OFOTO 2.0 (July 1993), the scan times for Ofoto were in error. The review indicated a time of 4 minutes and 33 seconds for Ofoto to scan the test image with the HP ScanJet IIc; the correct time is 31 seconds. This led Steve to conclude, "The one area where Ofoto really falls down is speed."

For the record, Ofoto scans as quickly as any desktop scanning software available—unless you are employing Ofoto's moiré-removal function. Mr. Roth believed that he had turned this feature off, but was tripped up by an anomaly in the user interface. This has been corrected in version 2.0.2, which is currently available.

Rob Cook
Chief Technology Officer
LightSource

As Mr. Cook points out, the long scanning time with the HP ScanJet IIc resulted because Ofoto's Auto Moiré Removal (AMR) feature was on. I turned it off prior to running the scan (it's on by default), but Ofoto 2.0 is set up so that the AMR setting used in the *prescan* is carried forward into the final scan—even if you explicitly turn off AMR prior to the final scan (which I did). Apple Color OneScanner owners should be aware that the version of Ofoto that originally shipped with that scanner has no option to turn off AMR. Those owners in particular should upgrade to the newest version, 2.0.2. Users of other versions should be sure to set up their prescans with AMR turned off.—Steve Roth **m**

Letters should be sent to *Letters, Macworld*, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1), or via Internet (70370.702@compuserve.com). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*.

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Come see, come try, come learn about the MessagePad at the Newton Showcase. It's at Symphony Hall on Tuesday, August 3, from 1 p.m. to 8 p.m., and on Wednesday and Thursday from 10 a.m. to 7 p.m. Bring your MACWORLD badge for admission.

And get ready to meet the Newton MessagePad from Apple. It's the help you've been looking for.

Apple

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How Do You Explain the Power of a Creative Idea?

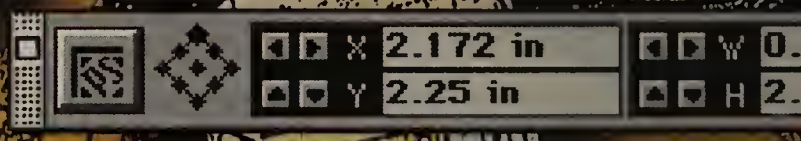
You don't. You show it.

And the best way to show it is with Aldus® PageMaker® 5.0 for the Macintosh. With more than 100 new or enhanced features, this new version of PageMaker makes it easy to produce your creative ideas *exactly* as you envision them.

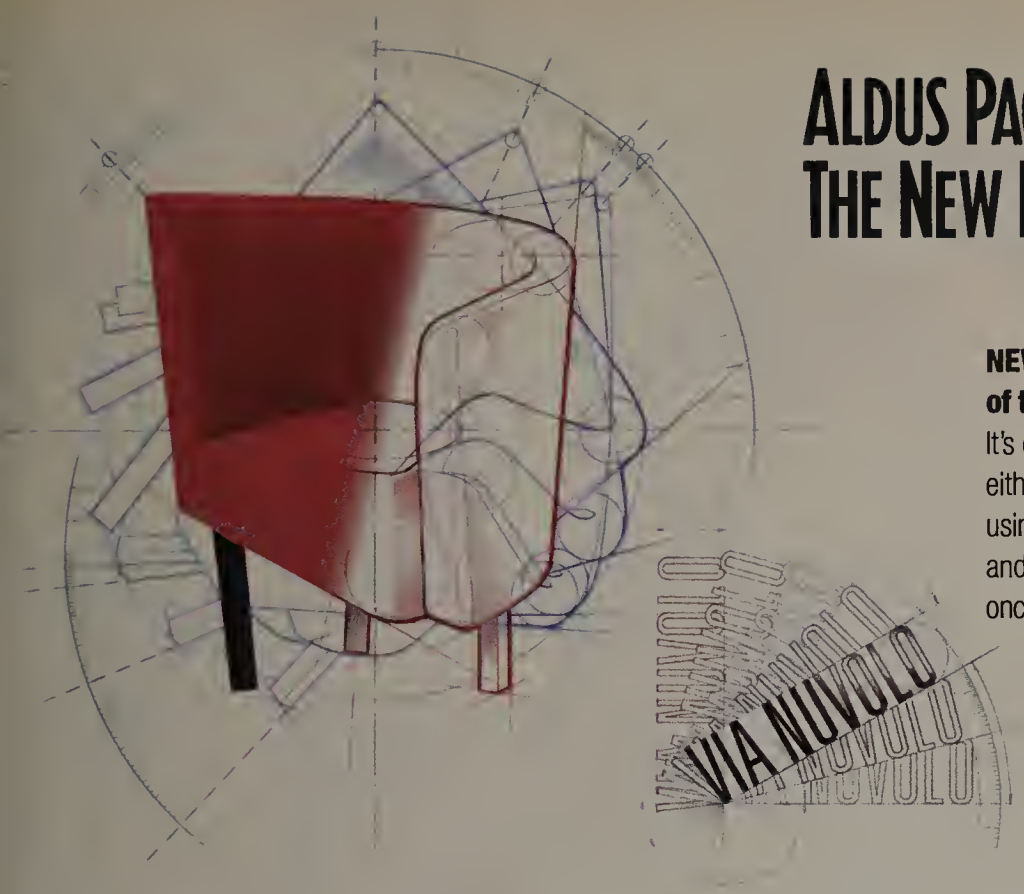
Right away, you'll find we've added to the power of PageMaker, giving you the freedom to create bold, dynamic, effective communications. With the kinds of advances in precision and control, versatility, *and* integration that let you focus on the really important stuff—like exploring ideas.

Add in its familiar, intuitive interface and Aldus' award-winning technical support, and it's no wonder PageMaker is the world's leading professional publishing software.

So take a look at the new and improved PageMaker. It's a powerful idea whose time has come.



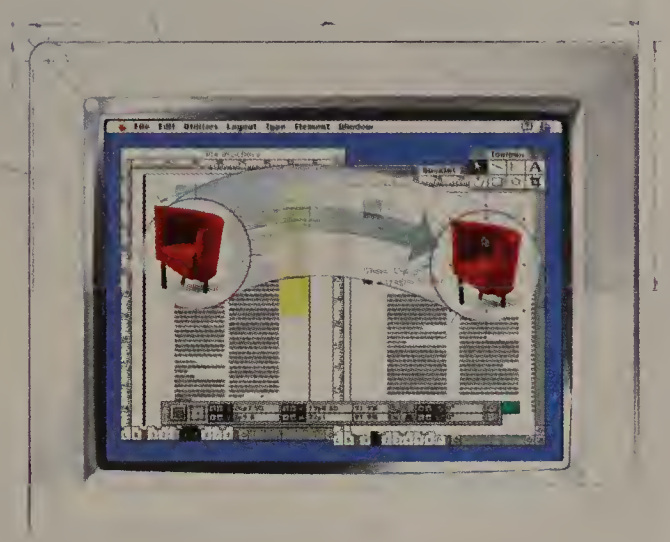
ALDUS PAGEMAKER 5.0— THE NEW FACE OF CREATIVITY.



NEW: Incremental rotation of text and graphics.
It's easy to rotate in 0.01-degree increments—either visually, using the rotation tool or numerically, using the Control palette (where you can also skew and mirror elements). You can even edit text directly once it's been rotated.

NEW: Multiple open publications.
Now you can work with unlimited publications open at the same time. Plus move elements among them simply by selecting an object in one publication, dragging it to another, and dropping it in.

NEW: Improved color.
You can create process-color separations from within PageMaker 5.0. Specify colors easily with an enhanced Colors palette. And when you import an EPS file, its colors are automatically added to the palette.



NEW: Control palette.
The completely revamped Control palette lets you easily and precisely place objects and apply text attributes. This powerful tool lets you handle much of your work without ever pulling down a menu.

THE NEW PAGEMAKER 5.0 FOR THE MACINTOSH WILL SPEAK VOLUMES ABOUT YOUR WORK.

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- Table of contents, index, and book capabilities
- Publications from 1 to 999 pages
- Built-in color separation
- Extensibility through Aldus Additions
- Irregular text wrap around all sides of an object
- Extensive typographic controls, such as leading, kerning, tracking, letter spacing, text width
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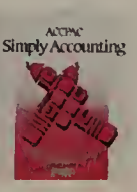

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"Vincent Van Cricket". All artwork done in CA-Cricket Draw III by Jim Jackson, winner of the inaugural CA-ImageNation Contest. Dial 1-800 CALL CAI for contest rules and more information.

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LATE-BREAKING NEWS

MacBulletin

Spindler Succeeds Sculley, Apple Lays Off 2500 After admitting to slumping earnings and thinning profit margins, Apple Computer announced in early July a "workforce reduction" of about 2500 people—nearly 15 percent of its worldwide staff. A 12-month restructuring will follow. Only two weeks earlier, the board of directors named Apple president Michael Spindler to succeed John Sculley as CEO. Sculley will continue as chairman, focusing on Apple's strategic alliances and on new business opportunities.

Apple Cuts Prices Twice, Gives Rebates Hoping to boost sales, Apple cut its retail prices in June and again in July. The price cuts ranged up to 34 percent on Macs, and up to 26 percent on peripherals. The steepest drop was on the PowerBook 160 4/40, to a new list price of $1609. Apple is also offering rebates on most Macs, and on any Performa (when the Performa is purchased with a printer). The Mac rebates, slated to end on September 30, range from $50 on a Classic II to $300 on a fully loaded Centris 610 or Mac IIvx. Apple did not drop the price or offer rebates on the LC III, Duo 230, Quadra 800, or Centris 650.

AOCE Ships in Beta Apple has shipped final beta copies of its PowerTalk system extensions, which incorporate E-mail and a few other services into System software, making it possible to send and receive mail and other documents across a network using the Finder. The embodiment of Apple's Open Collaboration Environment (AOCE) technology, PowerTalk's suite of services (E-mail, directory, encryption, and digital signatures) will be used primarily by developers to create networked applications.

CE Software Announces QuicKeys 3.0 As of the middle of August, QuicKeys users can expect more extension features, tighter integration, extensive AppleScript support, and an improved interface. In the new version, all QuicKeys functions will be available from the main edit window, including extension management, icon creation, and other utilities. Users will also get a raft of new, memory-lean extensions and more-accurate real-time recording, all for $169. CE Software, 515/224-1995.

HP Adds PostScript for the DeskWriter 550C At Macworld Expo in August Hewlett-Packard will introduce a PostScript software RIP for its extremely popular DeskWriter 550C color ink-jet printer. Called PostScript Software for the HP DeskWriter Family, the product is for the 550C only, according to HP, and is true Adobe PostScript Level 2. Slated to ship in early August, the software will have a list price of $249. Hewlett-Packard, 800/752-0900.

Accountant Inc. Rechristened, Relaunched State of the Art acquired Accountant Inc. from Softsync a while back and recently announced that the product is shipping in repackaged form as MacP&L for $269, or $599 for the multiuser version (see "Graphical Accounting Adds Up," *News*, August 1993). State of the Art also plans a major upgrade for MacP&L in the future. State of the Art, 714/753-1222.

A Bigger Slice for PIE Apple's Personal Interactive Electronics (PIE) division has set its sights on the electronic publishing market. PIE's publishing group plans to develop multimedia CD-ROM titles of its own, plus distribute titles developed by Time Warner Interactive Group and InterOptica, by year's end. In other news, PIE announced plans to collaborate with Ameritech, BellSouth, and US West, three Regional Bell Operating Companies, to develop new communications services for Newton customers and new communications devices that incorporate Newton technology.µ

News

EDITED BY TOM MORAN

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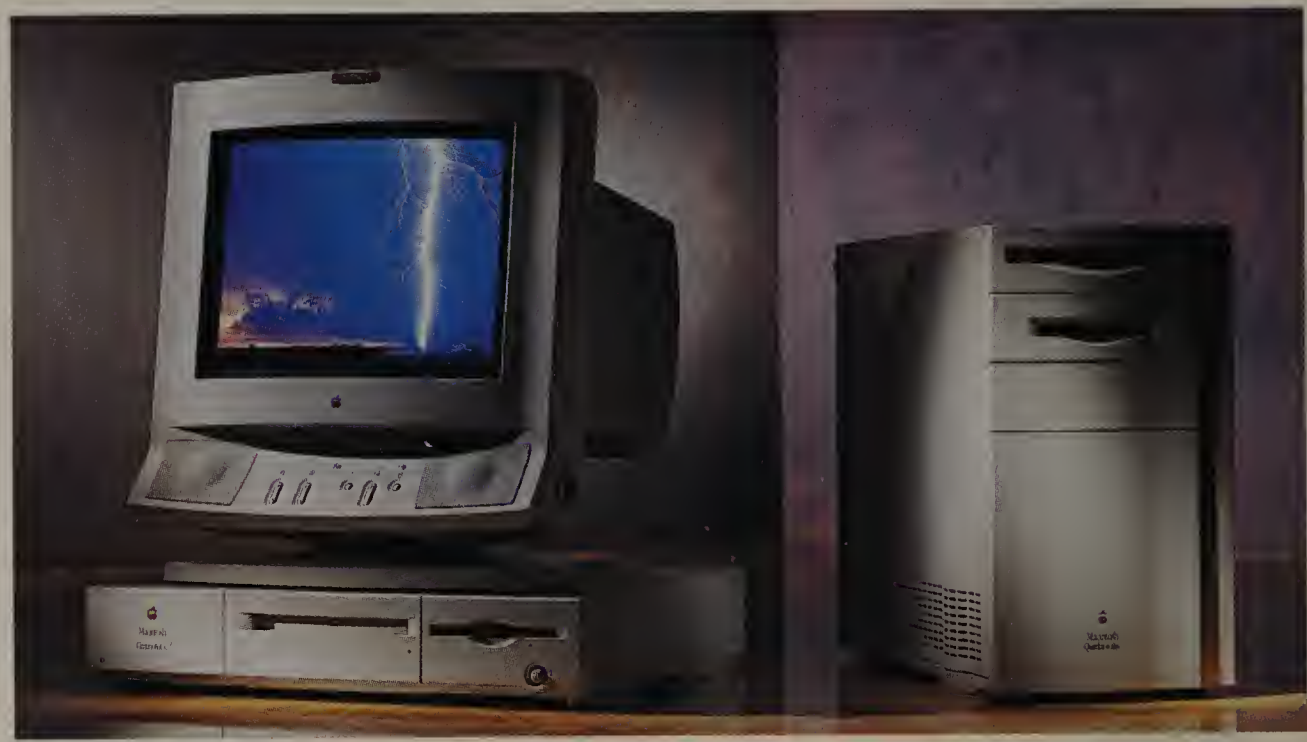
AV Cyclone and Tempest

AUDIOVISUAL MACS FORETELL SOPHISTICATED VIDEO, SOUND, AND TELEPHONY



MARK JOHANN

The latest flashes from Apple: the Centris 660AV (Tempest), topped by the AudioVision 14 monitor, and the Quadra 840AV (Cyclone), the most powerful Mac to date.

Sweeping past tired old DOS/Windows technology like a flash flood, Apple's audiovisual Macs set a new standard for the integration of audio, video, voice, and related technologies. The remarkable Quadra 840AV (code-named Cyclone) and Centris 660AV (code-named Tempest) provide numerous features that require third-party expansion boards in other Macs. Both systems can digitize video from a camcorder or other source; route their video signals to a TV set or video recorder; and record and play back CD-quality audio. For transferring the large files often required for these kinds of data, both AV Macs provide much faster NuBus and SCSI buses than other Macs.

For sheer power, the Centris 660AV uses a 25MHz 68040; the Quadra 840AV uses a 40MHz 68040. (Motherboard upgrades will be available for the Centris 610 and Quadra 800, respectively.) Pricing wasn't final at press time, but expect the 660AV to cost roughly $2500 with 8MB of RAM and an 80MB hard drive, and the 840AV to go for about $4500 with 8MB of RAM and a 230MB drive. Apple will offer both systems with internal CD-ROM drives and larger hard drives.

Built-in Modems—and Telephones

Several new components contribute to an AV Mac's capabilities, but chief among them is an AT&T 3210 digital signal processor (DSP) chip, which crunches huge amounts of data in real time. The DSP runs its own system software—the Apple Real-Time Architecture (ARTA)—that lets signal processing proceed independent of the Mac's 68040 processor. The Centris 660AV's DSP chip runs at a fast 55MHz; the Quadra 840AV's sizzles at 66MHz.

The DSP chip, among other functions, drives a new, high-speed connector called GeoPort, designed for telephony and telecommunications. Attach a $100 box called the GeoPort Telecom Adaptor, and an AV Mac suddenly has a built-in 9600-bps fax-and-data modem as well as a voice telephone and digital answering machine. Apple says the DSP-based modem is compatible with programs

that use the communications toolbox (most do). Third-party firms are working on voice-mail and video-conferencing programs. For the latter, Apple plans to release a tiny, monitor-mounted video camera in 1993.

Converse with the Mac

The most talked-about features of the new machines are likely to be their speech-recognition and speech-generation capabilities. Apple's PlainTalk speech software works with the DSP chip to enable the AV Macs to respond to voice commands. Unlike past speech-recognition products, PlainTalk doesn't require training—Apple has developed ways of isolating and identifying the sound characteristics that transcend individual voices and dialects. PlainTalk currently supports North American English only; localization efforts for other countries and languages are under way.

The AV Macs include utilities for creating voice-activated macros that open files, scroll windows, adjust system settings, and select palette tools. When third-party applications support PlainTalk, you'll be able to converse with programs in more detail to specify dialog-box options and select text and objects.

Speech recognition works on AV Macs only, but PlainTalk's text-to-speech features work on any 68020 or faster Mac. Most application programs must be updated in order to support text-to-speech (some programs can accept plug-in modules that add the feature—Microsoft has one for Word 5).

A Monitor for Sound

Whether you use an AV Mac for telephony, multimedia, or education applications, Apple's new AudioVision 14 monitor is an appealing package that sports a tack-sharp Sony Trinitron video tube, a built-in microphone, and a pair of stereo speakers. The monitor is studded with connectors for audio, video, and the ADB, allowing you to make connections without groping in back of the Mac. And it has convenient front-panel controls for volume, brightness, contrast, and muting the sound.

MARK JOHANN

Apple's AudioVision 14 monitor sports a built-in microphone (top center) and speakers.

The AudioVision 14's built-in mike works with PlainTalk voice recognition and with ApplePhone and third-party telephony applications, but does not work with existing Macs (except for the Color Classic). The monitor's circuitry prevents feedback when using an AV Mac as a speakerphone. The circuitry also automatically adjusts treble and bass for best fidelity at various listening levels.

At an approximate list price of $775, the AudioVision 14 display won't be cheap. But for anyone who wants to do serious multimedia production, the only drawback to the AudioVision 14 is the screen size. Apple hinted that it might introduce larger monitors with AudioVision features, but for telephony, speech recognition, and business video production, the AudioVision 14's mix of integration and its elegant software control make it ideal.

Something for Everybody?

The AV Macs are nothing if not versatile. The telephony and video-out features will appeal to business users and presenters. Video-in is useful for QuickTime producers (you'll still need a third-party board to capture full-screen video at 30 frames per second). Multimedia producers and consumers will love the CD-quality audio. Adobe Photoshop users will be attracted to the DSP's faster filtering. Educators and disabled users will benefit from PlainTalk. And our early benchmarks indicate that speed addicts will enjoy the machines' overall performance.

The power and versatility of the Tempest and Cyclone make them stepping stones to the PowerPC future—although inexpensive PowerPC Macs could make the AV Macs obsolete as early as the first half of 1994. But for the here-and-now, the 660AV and 840AV are fast, flexible machines that have no peers in the DOS world.—JIM HEID

Thunder In

Searching for an LC III? Call Circuit City

SHORTAGES REPORTED

If your heart's set on the wildly popular LC III, you'll discover it's hard to find at computer dealers, but there are possible alternatives. Retail stores such as Sears, Office Depot, and Circuit City seem to have an ample supply of Performa 450's, the LC's consumer-market twin.

Why would Peformas be available when LC III's are scarce? "That's Apple's new market; they don't want to upset their new channel," says David Polzine, assistant manager of ComputerWare, an

continues

In Brief

Blue-Light Special?
Apple Computer has authorized Wal-Mart Stores to sell a special version of the Macintosh Performa 400 4/80, with a keyboard, mouse, selected software, and a Performa Plus monitor, a higher-quality display than that normally sold with the Performa 400. The agreement initially covers 500 stores nationwide. Contact your local Wal-Mart; pricing may vary by location.

QuickTime Bargain Matinee
Movie Movie, a $349 NuBus board from Sigma Designs, captures 30-fps video (320 by 240) and 8-bit 22kHz mono audio. The board is a bare-bones arrangement: NTSC composite–only input, no print-to-tape option, and the frame rate drops to 10 fps at 640 by 480 screen size. Movie Movie ships with the company's ScreenEdit capture and playback software; another version comes bundled with DiVA's VideoShop QuickTime editing software. 510/770-2673.

Designer Bug-Fixes
With a $129, one-year subscription to the Design Tools Monthly Utilities Disk, you get all the free updates and bug-fixes to programs, utilities, and system software commonly used by designers. Some disks also include fonts; shareware and freeware utilities; plus any free QuarkXPress XTensions, PageMaker Additions, and Photoshop plug-ins of the month. Design Tools Monthly; 303/444-6876.

Mac Applications on Unix
Apple has announced that it is working with IBM, Sun, Hewlett-Packard, and Unix Systems Laboratories to bring Macintosh applications and system services to those platforms. Currently, Apple is developing high-speed application engines that will translate Mac toolbox calls directly into Unix system calls. 408/996-1010.

DIANE FENSTER

Consumers are grabbing for scarce LC III's; Performa 450's are nearly identical and are in stock.

all-Mac computer dealership in San Francisco. According to Polzine, computer dealers faced a similar situation when the StyleWriter II debuted in January; ComputerWare actually suggested to customers that they buy the printer at Montgomery Ward or Circuit City, since the dealership didn't know when it would get any.

Unfortunately, Apple's shortages go beyond the LC III, the most popular Mac. At press time customers were waiting for PowerBook 180's, Express Modems, and other products. Logic-board upgrades to the LC III and Centris 650 were also in short supply; Apple says it gives priority to shipping new systems over upgrades. However, Apple is not the only one with problems; would-be PC owners also face shortages of Compaq and IBM desktops and various notebook shipments.

Apple says its shipments have improved overall, and notes that the PowerBook 180c may help ease the 180 shortage. The scarcity of PowerBook 180's is partly due to continued problems getting displays from their maker (see *MacBulletin*, *Macworld*, February 1993). But demand is also a factor—Apple sold 100 percent more PowerBooks in the first quarter of 1993 than in the same quarter of 1992.

If the LC III shortage continues, users should consider buying a Performa 450 from a retailer. Virtually identical to the LC III, the Performa 450 includes a send-only fax modem, a 14-inch color monitor, a 120MB hard drive, and software packages. Retailers are charging about $1799 for the bundle; a similar configuration from computer dealers ranges from $1947 from ComputerWare in San Francisco, to $2197, but has an 80MB drive and a send/receive fax modem.

—DEBORAH BRANSCUM

Open Sesame Reads Minds

AGENT SOFTWARE

Charles River Analytics wants you to hire a personal agent. The company's Open Sesame observes user actions, learns repetitive patterns, and then automates those actions and patterns after getting the user's approval.

Now shipping, the $129 software's range of actions is currently limited to arranging windows; emptying the Trash; and opening and closing documents, applications, and folders. Smarter versions will follow as software vendors build Apple events into their apps. Charles River; 617/491-3474.—CAMERON CROTTY

Adobe/Apple Driver: Major Problems

SOFTWARE FIXES NEEDED

For many, the LaserWriter driver codeveloped by Adobe and Apple will be a welcome addition to the system software stable (see *MacBulletin* and *News*, *Macworld*, August 1993). But the printer driver's new architecture can make this horse skittish, and likely to balk if not handled properly. The driver supports PostScript Level 2 and allows finer control over printer features such as paper handling, but it leaves applications that rely on the Laser Prep extension or on undocumented QuickDraw calls twisting in the wind. Adobe's 12-page Read Me file details incompatibilities with over 35 applications, including the current Microsoft Word and Works, Aldus PageMaker, QuarkXPress, and Claris MacDraw Pro. Apple's file is shorter but packed with tidbits like, "When you are printing at 600 dots per inch (dpi), bitmapped images may appear with lines across the image," referring to Apple's own LaserWriter Pro 600 and 630 printers.

Despite both companies' statements that the drivers (Apple's LaserWriter 8.0 and Adobe's PSPrinter 8.0) have

continues

TREND

Amber: beyond Applications

DOCUMENT-CENTERED DESIGN

When the first Macintosh documents appeared nearly a decade ago, they could hold a mix of text and bitmapped graphics, a revolutionary accomplishment. Now a Mac document can contain so many heavy elements, the little document rowboat is about to sink. That's why Apple is working on Amber, an open document architecture that should prove unsinkable (see *MacBulletin, Macworld,* August 1993).

Promised for the second quarter of 1994 for both Macintosh and Windows, Amber will support documents made of smaller parts with different types of content: graphics parts, spreadsheet parts, video parts. Today you could put all of these parts into a Microsoft Word document, but it would have the Word file type, and you'd have to work according to Word conventions. In the Amber model, you simply have an Amber document, with parts that are edited in frame areas, each with its own software components.

It will be possible to write smaller, modular applications. Most of the document integration now

HANK OSUNA

handled by applications will be done by Amber, so each application will only have to be complex enough to affect its own part of the document. Developers will be getting the tools to make this transition in late 1994. Apple plans to make Amber also work with Taligent systems technology—the Apple-IBM operating environment of the future.

—CHARLES SEITER

the same features and functions, Apple's 12-page Read Me file fails to mention numerous incompatibilities listed in the Adobe documentation, including six bugs that result in system errors. Apple is investigating the differences in the documentation.

Apple and Adobe both say vendors are promising to update their incompatible application software. Claris confirms it is planning fixes for its applications, but Microsoft representatives deny any incompatibilities, while PageMaker 5.0, still under development at Aldus, completely depends on the new driver, according to Ben Rotholtz, Aldus senior program manager for PageMaker.

Check with the vendors of your favorite software to see if it's compatible with the new driver.—CAMERON CROTTY

Passport Updates Producer

PRESENTATIONS

Passport Designs, maker of the $795 Passport Producer multimedia production system, is shipping version 2.0, which adds control of external devices, path-based animation, expanded SMPTE support, and user-definable buttons for interactive presentations. Producer acts as a control center, synchronizing graphics, QuickTime, and audio into a presentation. Passport Designs, 415/726-0280.—CAMERON CROTTY

Passport Producer 2.0 offers path-based animation and user-definable buttons for interactive presentations.

STEVE FINN

GRYPHON SOFTWARE

Morph can now make transitions between two moving images. Or, snap your boss and use the caricaturing feature to add a little distortion (right).

More Morph

DOES CARICATURES

Seems you can't watch a movie or turn on the television these days without seeing someone's features melt into someone (or something) else. Gryphon Software's Morph 2.0 promises nothing but more malleable mugs.

The new package can make a transition between two moving images, instead of just stills, and the new version renders fields for higher-quality output. Users can also morph a still image using another image as a baseline; called caricaturing by Gryphon, this technique results in exaggerated, cartoonlike features. Morph 2.0 is currently available for $239. Gryphon Software, 619/536-8815.

—CAMERON CROTTY

BUGS & TURKEYS

Microtek's ScanMaker II Photoshop plug-in, version 2.04, was released to correct a bug in 2.03 that occasionally destroyed boot blocks on a hard drive (see "Bug Report," *News*, *Macworld*, June 1993). But version 2.04 sometimes writes to a removable disk drive as if it were a scanner thereby erasing the disk. Microtek says version 2.05, available free, fixes the problem.

Save your documents before your PowerBook 160, 180, or Duo goes to sleep with Word or Excel in the foreground. If backlight dimming is on, your PowerBook will crash on wake-up, or it might not start up until you restart. Microsoft has no fix available or announced.

Launching Apple File Exchange hangs the Color Classic. Apple says that the Hardware System Update 1.0 extension fixes the problem. It's available free from dealers, online services, and user groups; or for $10 from Apple (800/892-4649).

Thought Apple's At Ease would protect your desktop? Only if you alter your work setup and remove everything from the Startup Items folder and remove utilities like Now Menus. Start-up items are there for the choosing under the Applications menu, and Now Menus gives access to everything under the Apple menu (control panels excepted).

In Brief

If I Had a Hammer

FWB has announced five storage products: two hard drives, a disk array, a DAT autoloader, and a removable-cartridge drive. The 210MB hammerPB210 internal drive for the PowerBook lists for $829; the 1.6GB hammer-1600FMF external drive lists for $2569, and the internal for $2249. The SledgeHammer-3200FMF uses two 1.6GB mechanisms and supports RAID Levels 0 and 1; the internal version lists for $4589, and the external for $4789. The $4429 hammerDAT20G automatically switches between four 5GB DAT tapes. The $1249 hammer-Disk105 is based on the 105MB 3½-inch SyQuest removable mechanism. All the products are shipping. 415/474-8055.

Viral Update

Version 3.5 of Symantec Anti-Virus for Macintosh can now be updated to recognize and protect against the recently discovered INIT M virus. Users can download the update free of charge from the Symantec bulletin board (408/973-9598), AppleLink, CompuServe, or America Online, or can order a disk from Symantec for $12. 408/252-3570.

Blazing SCSI

DayStar Digital's NuBus SCSI accelerator, the Diskrunner, uses a Motorola 68000 to control SCSI operations independently of the Mac CPU. The Diskrunner ships with an empty RAM cache (expandable to 16MB). Available for $699. 404/967-2077.

Faster Finder

Mr. File cuts the time you spend waiting for the Finder. The new version provides background network copying that doesn't interfere with foreground work (even under System 6), file synchronization and update options, faster copy performance, and more file-search criteria. Available for $99 from Softways. 408/978-9167.

Transforming Macs to the PowerPC Line

THE NEXT GENERATION

Everywhere you look, including here, you see reports of the fabulous PowerPC, zooming away at 50MHz or 66MHz, leaving poky 68040s in its wake. The new RISC chips, the first of which is the PowerPC 601, will give workstation performance in a consumer PC, making possible such formidable tasks as speech recognition, full-screen video, and real-time 3-D rendering.

In addition to the first PowerPC-based systems, Apple will offer board-level upgrades for the Centris 610 and 650, Performa 600, Quadra 800, and the Mac IIvx and IIvi. The company expects to ship the first PowerPC products in the first half of 1994. In fact, Apple demonstrated a prototype PowerPC Macintosh in May. Samples of the PowerPC 601 chip (made by both Motorola and IBM) have gone to a dozen third-party developers, who are busy designing PowerPC-based accelerator boards for other existing Macs. Meanwhile, IBM, Motorola, and Apple are working on other PowerPC chips: the cheaper PowerPC 603, the faster 604, and the blow-the-doors-off 620.

Apple hopes that most Macintosh applications will run unchanged on the new systems. The company says outside software developers are rewriting their major applications to take advantage of additional speed improvements that are possible with PowerPC-specific code. Meanwhile, Apple will continue to sell traditional Macintoshes powered by 68030 and 68040 chips for several more years.—CHARLES SEITER

THE AMCOEX INDEX OF USED MAC PRICES

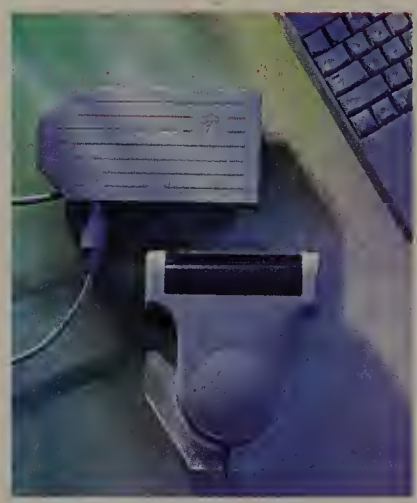
Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	$500	–$50
Mac Portable/1MB/40MB	$650	$0
PowerBook 100/4MB/40MB	$900	–$100
PowerBook 140/4MB/40MB	$1350	–$150
Mac Classic/2MB/40MB	$575	–$25
Mac SE/30/2MB/40MB	$825	–$100
Mac LC/2MB/40MB	$700	$0
Mac II/4MB/40MB	$800	–$100
Mac IIsi/3MB/40MB	$1025	+$25
Mac IIcx/4MB/80MB	$1250	–$50
Mac IIci/4MB/80MB	$1750	–$150
Mac IIfx/4MB/80MB	$1900	–$100
Apple 12-inch B&W display/board	$125	$0
Apple 13-inch RGB display/board	$400	$0
LaserWriter Plus	$600	–$25
LaserWriter IINT	$900	–$100

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during week of June 23. Configurations include keyboard and exclude monitor and display board for noncompact models.

A Handful of Thunder

PORTABLE SCANNER

Your PowerBook is portable, so why shouldn't your scanner be? Desktop Mac veterans (or even Apple II scan warriors) might recognize the business end of this hand-held scanner, but this package is built to go wherever your PowerBook does. Thunderware's LightningScan Portable combines a 400-dpi, 1-bit hand scanner with a rechargeable battery pack built into a separate serial interface box. The box-scanner combo weighs about a pound, and the rechargeable battery pack provides about 30 minutes of scan time, according to the company.



SCOTT PETERSON

Watch out for turbulence if you use the LightningScan Portable on the commuter shuttle flight.

The $450 package will ship in August with ThunderWorks, the company's image-scanning and -editing software. It will also come with a Silicon Beach (Aldus Consumer Division) plug-in for scanning within supported software, plus Olduvai's Read It OCR Personal software. Thunderware, 510/254-6581. —CAMERON CROTTY

TOP FIFTEEN BUSINESS SOFTWARE PACKAGES

Months on Chart	Last Month	This Month	
99	3	1	**Microsoft Word** Microsoft Corporation
51	5	2	**FileMaker Pro** Claris Corporation
90	2	3	**Microsoft Excel** Microsoft Corporation
13	6	4	**ClarisWorks** Claris Corporation
21	1	5	**Microsoft Office** Microsoft Corporation
76	4	6	**Microsoft Works** Microsoft Corporation
37	11	7	**Quicken** Intuit
39	9	8	**QuarkXPress** Quark
1	—	9	**Now Up-to-Date** Now Software
20	7	10	**MacDraw Pro** Claris Corporation
8	—	11	**Microsoft PowerPoint** Microsoft Corporation
1	—	12	**Adobe Photoshop** Adobe Systems
31	—	13	**Adobe Illustrator** Adobe Systems
51	8	14	**WordPerfect for the Macintosh** WordPerfect Corporation
1	—	15	**Kai's Power Tools, Volume 1** HSC Software

Source: Information from Ingram Micro on units shipped to Macintosh retailers during May 1993.

Outbound User Help

TECH SUPPORT

PerFit, a company based in Boulder, Colorado, says it is providing service, support, and upgrades for Outbound Systems' Mac-compatible laptop products.

The 2030V CPU Board upgrade adds a 40MHz 68030 —users pull their original CPU board, move the RAM (and FPU, if necessary) to the 2030V, and plug it in. The old

CPU boards can be sent to PerFit for a rebate.

The 2030V is available for $699. Technical support is available via fax, BBS (303/444-7569), or at 900/737-3488 (which is billed at $1.25 per minute). PerFit, 303/530-7333.—CAMERON CROTTY

Where do you go for a free drive?

La Cie's & Macworld's Porsche Sweepstakes.

We'd love nothing better than to give you a high-performance drive.

Who says La Cie's drive speed has to be in milliseconds? This August, some lucky winner of our **FREE 1990 PORSCHE CARRERA 2*** will get the La Cie™ drive of their lives in miles per hour. As the industry's leading manufacturer of mass-storage solutions for Macintosh computers, we never stop thinking of great ways to give our customers streamlined styling and high-speed performance. And what better way to remind you of La Cie's state-of-the-art drives, than to give away the kind of trend-setting hardware that inspires us.

ENTER NOW TO WIN, AND REQUEST A FREE CATALOG!

To enter, simply fill out the entry blank provided and mail to: La Cie, Ltd. 8700 S.W. Creekside, Beaverton, Oregon 97005. Deadline for entries is Midnight, August 7, 1993. See sweepstakes rules below. Be sure to fill out the entire form and please print clearly. **To qualify for drawing, all questions must be answered on the original form provided below.**

Be sure to look for our La Cie product ads on the following pages and in the direct mail section of this publication.

LA CIE'S SWEEPSTAKES RULES

1. Winner will be selected in August 1993 in a random drawing conducted by La Cie, Ltd. or its designee. All decisions are final. Prize is valued at over $45,000.
2. Sweepstake is open to all residents of the U.S. over 18 years of age except employees of La Cie and Quantum and where prohibited or restricted by law which includes without limitation New York, Rhode Island and Florida.
3. Drawing is limited to one entry per person. The entry deadline is Aug. 7, 1993. Entries received after August 7, 1993, will automatically be eligible for our next sweepstakes. (Prize to be determined)
4. Winner to be notified by mail or phone and may be required to sign an affidavit of eligibility and a release as a condition of receiving prize. In the event that the winner does not respond within 30 days, an alternate will be chosen.
5. Odds on winning depend on the total number of entries received. No prize substitutions or cash payments are allowed.
6. Original entry form must be completely filled out to be eligible. Facsimile or copy not acceptable.
7. Taxes, liability, and delivery of the prize are the responsibility of the winner.
8. For notification of the winner, send a stamped self addressed envelope to La Cie, Ltd. a Quantum Company, 8700 SW Creekside Place, Beaverton, OR 97005.

* Porsche shown is not the actual sweepstakes prize described herein.

Enter me in the La Cie Porsche Carrera 2 Sweepstakes MW

Name_____

Company_____

Title _____

Street_____

City, State, Zip _____

Phone Number _____

Number of Macs at my location:_____

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Circle 53 on reader service card

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Poor Claris. Once again, Canvas™ is running circles around MacDraw® Pro. In fact, they are still trying to catch up to Canvas 3 while we've added dozens of new features and enhancements to create Canvas 3.5. Like 3-D extrusions of text and graphics, enveloping of text and graphics, smart lines, fine kerning, fractals, automatic concentric circles and spirals, and a tool loader that allows you to add tools as you work. There's even a versatile pressure-sensitive freehand Bézier pen tool. And Canvas 3.5 has really outdone itself with new improvements including object blends, binding of text to shapes and curves, Beziér text conversions, and macro windows. Which is just the beginning, because Canvas also includes all the great features of 3.0 like custom parallel lines and curves, our unique SmartMouse™, and more. Comparing Canvas to the competition is like comparing a superbike to a tricycle. And only Canvas is self-upgrading, allowing you to add new tools, effects and file translators at will. Last but not least, while MacDraw Pro is idling somewhere back in the Dark Ages, Canvas features seamless file sharing with its recently released Windows version. Add it all up, and it's easy to see that it's time to shift gears to Canvas. For the ultimate in value and performance, Canvas gives you the ride of your life. So go ahead and hop on.

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Circle 57 on reader service card

New Products

THE LATEST MACINTOSH RELEASES

By Cameron Crotty

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY *MACWORLD*. UNLESS OTHERWISE STATED, THE MINIMUM REQUIREMENTS FOR OPERATION ARE A MAC PLUS, WITH 1MB OF RAM, RUNNING SYSTEM 6. ALL INFORMATION AND PERFORMANCE CLAIMS ARE SUPPLIED BY THE PRODUCT VENDOR AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY *MACWORLD*. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

40 MHz Turbo 040

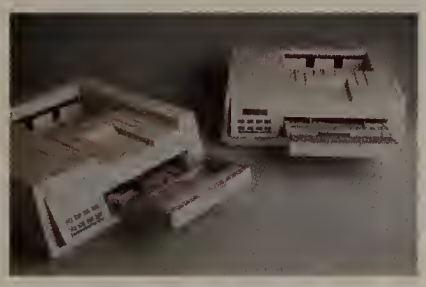
Faster and faster and faster and . . . This 68040-based accelerator is available in 25MHz, 30MHz, and 40MHz models. The product uses the PDS slot on the Macintosh IIci and fits the Mac IIsi with an adapter (sold separately); the 40MHz version ships with FastCache Turbo, a $199 128K secondary memory cache that increases performance (optional on the 25MHz and 33MHz). The product also supports the Mac II, IIx, IIcx, and SE/30 with an adapter; and supports the Mac IIvi, IIvx, and Performa 600 without an adapter. 40 MHz Turbo 040 $2399; 25MHz $1299; 33MHz $1599; adapter $49. DayStar Digital, 404/967-2077, 800/962-2077; fax 404/967-3018.

Accomplice

This Mac IIsi–specific accelerator plugs into the PDS slot and features a 50MHz 68030 processor, a 32K cache, and an FPU. The product also includes a pass-through slot for attaching an additional PDS board. $699. Extreme Systems, 206/575-2524, 800/995-2334; fax 206/575-3928.

APS T 213

Shocking as it may seem, APS is shipping another hard drive. This 213MB PowerBook-stuffer features a 12.1ms average seek time and comes in three flavors: internal, external AC-only, and external AC/DC-powered. Internal $599; external AC-only $659; external AC/DC $729. APS Technologies, 816/483-6100, 800/235-2753; fax 816/483-4459.



BLP Eclipse 4 and 8

BLP Eclipse 4 and 8

These LED printers are both compatible with PostScript levels 1 and 2; both include AppleTalk interfaces; and both ship with 2MB of RAM, upgradable to 6MB. The BLP Eclipse 4 features a 4-ppm print engine and comes with 17 fonts, and the BLP Eclipse 8 features an 8-ppm print engine and comes with 35 fonts and a built-in Ethernet board. BLP Eclipse 4 $1099; BLP Eclipse 8 $1799. GCC Technologies, 617/275-5800, 800/422-7777; fax 617/275-1115.

ErgoView 20

This 20-inch Trinitron color monitor (.31mm aperture pitch) can switch between resolutions on-the-fly, from 1600 by 1200 pixels down to 640 by 480 pixels at refresh rates of 72Hz to 120Hz. This product meets the Swedish MPR II emissions guidelines. $3199. Sigma Designs, 510/770-0100, 800/845-8086; fax 510/770-2640.

FastMath LC III

You can put a rocket in the back pocket of your LC III with this FPU. The board contains a 25MHz 68882 FPU that increases performance of math-intensive software. $109. Applied Engineering, 214/241-6060, 800/554-6227; fax 214/484-1365.

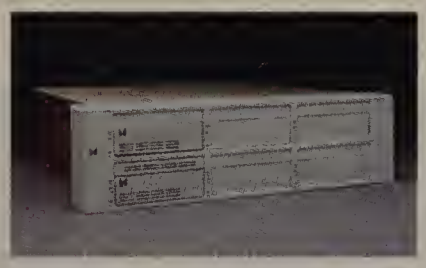
Hello Music

Hello Music

From the music 'n' motorcycles company (go figure), this package consists of the CBX-T3 Tone Generator and Turbo Trax software from Passport Designs. The CBX-T3 is a polytimbral MIDI module that features 192 instrument sounds, 10 drum kits, a digital reverb unit, and an input jack for mixing in external audio. The unit plugs into the Mac's serial port, and includes MIDI in and out ports. $449. Yamaha Corp. of America, 714/522-9011; fax 714/522-3913.

IncreMeg 6000

If you have a weak stomach or are upset by massive amounts of raw, churning data, don't read any further. This hard drive subsystem has room for up to six 3.5-inch removable drives of varying sizes for up to 7.2GB of anything your heart desires. The product features fully enclosed drive cartridges, two separate SCSI buses, and lots of status LEDs (cartridge power, SCSI bus activity, and safe removal). $19,500. MountainGate Data Systems, 714/998-6900, 800/556-0222; fax 714/637-4060.



IncreMeg 6000

Mac 'n Touch SA-14 Monitor

If you can't reach out and touch someone, you can at least make contact with your monitor. This 14-inch color monitor has a .28mm dot pitch, a resolution of 640 by 480 pixels, a vertical scan rate of 50Hz to 90Hz, and features an integrated capacitive touch screen accurate to 1024 by 1024 touch points. The product ships with a Macintosh software driver control panel. Touch screen gets in through the ADB port. $1495. MicroTouch Systems, 508/695-9000; fax 508/695-9100.

MacTrans-10T

This 10BaseT transceiver plugs into an Apple Ethernet board and converts Apple AUI Ethernet signals to 10BaseT signals. The transceiver requires no external power and includes Power/Transmit, Link/Receive, and Collision LEDs. $98. Unicom Electric, 310/946-9650, 800/346-6668; fax 310/946-7473.

QA-350

This color, 10-inch, LCD projection panel scans out two display lines per pass to increase refresh speed. Users can select either 512- or 64-color display with a switch on the side, and the panel features loop-through wiring so that it can be used simultaneously with a monitor. $3000. Sharp Electronics Corp., 201/529-8731, 800/237-4277; fax 201/529-9636.

QA-350

QMS 2025 and 3225

If your slow printer is sagging under the weight of an increased work load, you might consider lashing one of these high-horsepower laser printers to your network. Both printers are 400-dpi true resolution, and feature simultaneously active LocalTalk, serial, and Centronics interfaces (with Ethernet optional), automatic emulation switching between PostScript levels 1 and 2 and PCL 5, an internal 40MB hard drive, and 16MB of RAM. The 2025 has a 20-ppm engine, and the 3225 has a 32-ppm engine. 2025 $12,995; 3225 $19,995. QMS, 205/633-4300, 800/631-2692; fax 205/633-0116.

RediModem PB-1440 and PB-9600

These internal PowerBook fax modems each support MNP 4 and V.42 error correction, MNP 5 and V.42bis data compression, and 9600-bps send/receive fax. The PB-1440 includes a 14.4-Kbps data modem (V.32bis), and the PB-9600 features a 9600-bps data modem (V.32). PB-1440 $499; PB-9600 $429. Data Race, 210/558-1900; fax 210/558-1929.

UC1200SE

This 1200-by-600-dpi (true-resolution) SCSI color scanner scans up to 8½-by-11-inch reflective originals in a single pass. The product captures up to 10 bits of color data per pixel and ships with PixelCraft's ColorAccess separation software as well as the QuickScan plug-in module for Photoshop or ColorAccess. $4600. Umax Technologies, 408/982-0771, 800/562-0311; fax 408/982-0776.

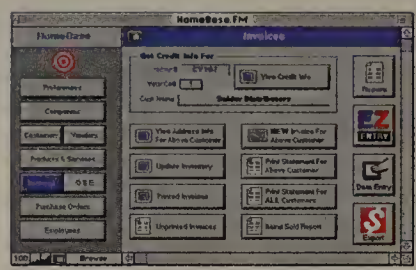
continues

Unity 1200XL-O/1200XL-T
These 600-dpi true-resolution laser printers print on plain paper up to 12 by 9½ inches with full bleeds. Both printers feature PostScript and PCL 4 interpreters with automatic emulation-sensing and multiple active ports. The 1200XL-O comes with Ethernet and LocalTalk interfaces, 32MB of RAM, an 80MB hard drive, and 235 resident typefaces. The 1200XL-T features a LocalTalk interface, 21MB of RAM, a 40MB hard drive, and 135 resident typefaces. 1200XL-O $9995; 1200XL-T $6995. LaserMaster Corp., 612/944-9330, 800/477-7714; fax 612/944-0522.

Vision 35
This 35mm slide scanner can handle both color and black-and-white positives and negatives. The maximum resolution is 5000 by 5000 pixels, and the scanner ships with Agfa's FotoLook driver software. $9500. Agfa Corp., 508/658-5600, 800/685-4271; fax 508/658-4193.

SOFTWARE

Biz Basics Pro
Did you swear to get organized when you bought your Mac? This FileMaker Pro database manages orders, invoices, inventory, employees, vendors' and customers' files, and prints out all the data in customizable reports. Additional shipping and zip code utilities are available. $298. Working Solutionz, 805/522-2170; fax 805/527-7787.


Biz Basics Pro

Budget & Construction
This program tracks resources and handles budgets for construction projects. The product features user-definable reports, item and price import options, and coding options for government projects. $960. Manapro, 305/486-5900, 800/833-4776; fax 305/486-8771.

The Card Collector for Macintosh
If you smell peanuts and Cracker Jacks while you're using this sports-card database, don't be surprised. This package allows users to track which cards they have, how much the cards are worth, and which are needed to complete a set. The included card database covers over 70,000 baseball cards from 1948 to 1993, including names, card numbers, prices for three conditions, first card, and rookie card. Football, basketball, and hockey databases also available. $49.95. AbleSoft, 804/898-8484, 800/545-9009; fax 804/898-8282.

Charger Suites: Volume One
This package includes both standard Photoshop plug-ins and Extension Modules for Photoshop 2.5 that use Storm-compatible DSP accelerator boards to speed up resize, sharpen, unsharp mask, blur, Gaussian blur, and other filters. The product also includes PowerPreview, for rapidly previewing filter effects on a selected portion of the image. $199. Requires Storm-compatible DSP accelerator. DayStar Digital, 404/967-2077, 800/962-2077; fax 404/967-3018.

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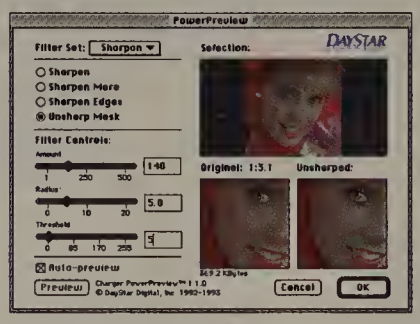
We know you never used Cliffs Notes to get through an exam or term paper. We know you always read the original text first. We know that you'll never use this new software line to make up for missed classes or late-night partying. But just for your information, Cliffs Notes now offers course-review guides in biology, calculus, chemistry, economics, physics, and statistics. The company also offers test-preparation software for the SAT, ACT, GRE, CBEST, GMAT, and LSAT. $39.95; test-prep software (except LSAT) $49.95; LSAT prep $59.95. Cliffs Notes, 402/423-5050, 800/288-4078; fax 402/423-9254.


Charger Suites: Volume One

Color Extreme
This graphics-conversion utility handles dozens of file formats from RGB to CT Scitex and supports Adobe Photoshop–compatible plug-ins, global color correction, screen color calibration, and cropping with trim and bleed control. 16MB min. memory; requires Mac II with FPU, 8-bit color, and 13-inch monitor. $895. Human Software Company, 408/741-5101; fax 408/741-5102.

ColorUp
Most folks have trouble remembering not to wear white before Easter and after Labor Day let alone trying to color-coordinate their business presentations. This utility features over 1500 color palettes created by professional designers specifically for use in business graphics. The palettes consist of color combinations that work well together and have been tested on transparencies, 35mm slides, screen displays, and hard copy. Also included is a hands-on tutorial explaining color science, psychology, harmony, and tips and tricks. Requires 8-bit color and 13-inch monitor. $99.95. Pantone, 201/935-5500; fax 201/935-4147.

CoPilot Infrared Link
With this hardware-software combination, you can control up to six media devices (VCRs, TVs, videodisc players, and so on) via an infrared remote control. The product contains control codes for over 1000 devices, plus options for user-defined codes. $795. AirMouse Remote Controls, 802/655-9600; fax 802/655-5149.

Flo'
This application lets you mush, stretch, skew, rotate, distort, and pull all or part of a graphic. You can transform parts of an image, leaving the rest of the image unchanged. Supports QuickTime, and alpha-channel compositing for stills and animation. 5MB min. memory; requires Mac II with FPU. $199. Valis Group, 510/236-4124; fax 510/236-0388.

FullPixelSearch
Why let the text-hounds have all the fun? This program lets users search for a pattern of pixels within 8-bit TIFF and PICT images up to 3000 by 3000 pixels. Search patterns can be created by hand or cut and pasted; users can adjust search accuracy in 1 percent intervals. Requires 8-bit color. $900. General Image, 212/246-4686; fax 212/246-6074.

IntelliTalk
Your Mac can say it out loud with this application. As you type, the software uses MacinTalk to speak letters, words, and sentences. The package acts like a word processing program, offering full control over character font, size, and style, and includes illustrated menus for young users. Users can edit the pronunciation of words and create an exception list for words that don't follow normal pronunciation rules. $39.95. IntelliTools, 510/528-0670; fax 510/528-2225.

Island Imposition Publisher
This package allows users to prepare ready-to-print impositions from PostScript DTP programs. The Personal Professional version ships with filters for QuarkXPress, Aldus PrePrint, and PageMaker. The Studio Professional version includes 13 filters covering additional DTP software. 4MB min. memory; requires System 7. Personal Professional $2195; Studio Professional $3995. Island Graphics Corp., 415/491-1000, 800/255-4499; fax 415/491-0402.

JAG II
The latest version of this antialiasing utility reduces or eliminates jagged edges in a graphics image (black-and-white to 32-bit color) by adding intermediate colors to blend the edges, or by smoothing the edges with increased resolution while maintaining the original color palette. The product now supports QuickTime, TIFF, Photo CD, and EPS formats. $129. Ray Dream, 415/960-0765; fax 415/960-1198.

LetterGraphics
These EPS files contain 3-D, beveled letters in several colors, 20 letter styles, and either silver or gold bevels. Letters can be scaled, stretched, and rotated, and can be printed in black-and-white or color. Letter sets include uppercase and lowercase letters, numbers, and punctuation marks. Headline sets come without lowercase letters. $39.95; headline sets $29.95. Nova Cube, 302/655-4486, 800/728-5052; fax 302/655-2913.

Meeting Maker XP
When the Windows people are there, the Mac people aren't. When the Mac people are around, the Windows group is out to lunch. This new version of Meeting Maker could mitigate cross-platform scheduling hassles. Users pick a time and date for meetings, select required and optional guests, reserve meeting resources, prepare agendas, and send attachments. The product can automatically find the first available time for all required attendees; provides personal calendars for appointments and activities. 2MB min. memory; requires server. 5-user license $695; 10-user $1195; 50-user $5595. On Technology, 617/876-0900; fax 617/876-0391.

MIC/Tech
Trying to keep up with equipment information overflow? This database includes product specs and prices on PCs, portables, laptops, notebooks, workstations, minicomputers, mainframes, and supercomputers. Product includes company's Textware search-and-retrieval software and 24-hour telephone support. $733; five-station LAN $1466. Management Information Corp., 609/428-1020, 800/678-4642; fax 609/428-1683.

Now Compress
Squeeze it down, squeeze it down, wa-a-a-a-y down. This file-level software-compression package offers idle-time, on-demand, and archival data compression. Users can compress an entire disk, or manually select or exclude files by type, creator, and label. The software features the Inspector window, which lets the user view the status of all files stored on a drive, including original and compressed file sizes and space-saved percentages. Single user $99; 50-user pack $3799. Now Software, 503/274-2800; fax 503/274-0670.

Pathways Into Darkness
What? You mean you've never been dropped alone into an immortal demon's body? You say you've never had to carry a nuclear device past hordes of otherworldly monsters? This game offers these unique experiences in a real-time, 3-D texture-mapped environment. You also get actively panning stereo sound and a special performance mode to help the game run faster on slower computers. Of course, that won't help you run faster when you're out of ammo and being chased by a ravenous gas-beast. Oh boy! Barbecued gamer! 2MB min. memory; requires 8-bit color and hard drive. $69.99. Bungie Software Products Corp., 312/493-2849; fax 312/493-4557.

Pixar One Twenty Eight
These seamlessly tiling, 24-bit digital textures were developed for Pixar's image and film projects. The product includes 128 textures in 13 categories, ranging from bricks and fabrics to animal skins and ground covers, as well as a Photoshop plug-in for previewing and selecting textures. $299. Pixar, 510/236-4000; fax 510/236-0388.

Places & Faces 1
Multicultural is the buzzword of the nineties, and this package of EPS clip art

continues

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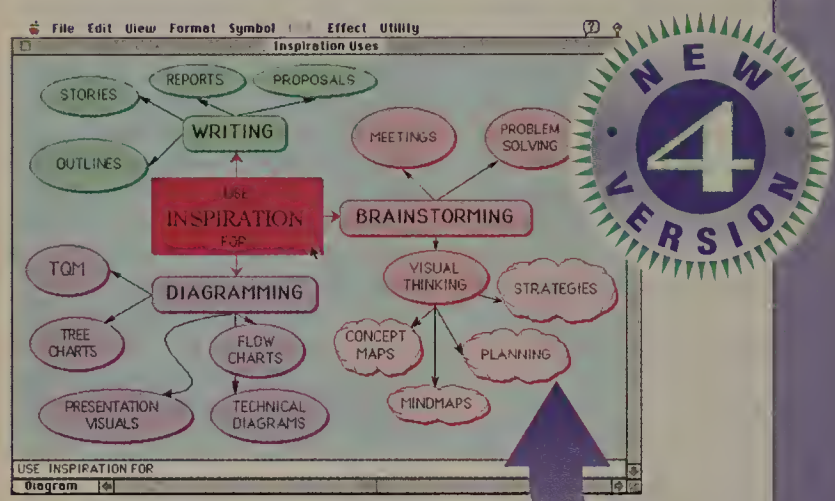

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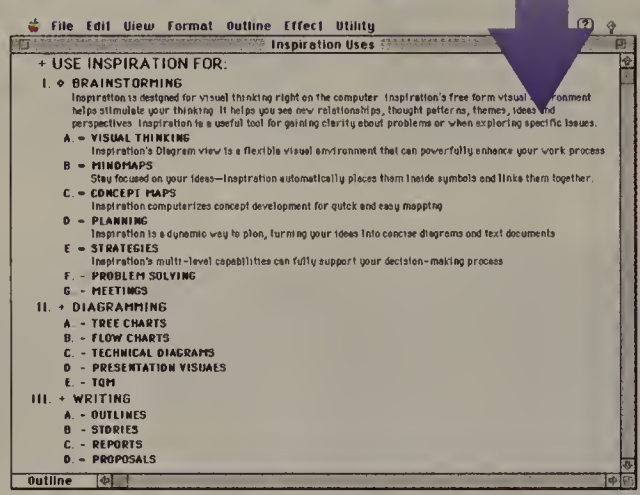

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ACCESSORIES

Mac GamePad
If you thought that playing games on your Macintosh was a sure way to avoid Nintendo-thumb, you can guess again. This ADB device looks just like the game pads that shipped with bazillions of cartridge-based entertainment systems: a thumb pad on one side and fire buttons on the other. Users can configure the pad for right- or left-handed use, and the unit ships with a software control panel that automatically sets up control and button functions for each game. $49.95. Advanced Gravis, 604/431-5020, 800/ 663-8558; fax 604/431-5155.

Mac GamePad

NiteCaps
A dusty Mac is an unhappy Mac, according to this company. Its product is a set of brightly colored dustcovers for Macintoshes, monitors, and keyboards. Several patterns are available, including fish, plaid, chili peppers, and junk food. $18 to $25. NiteCaps, 415/665-0668; fax 415/665-3138.

SCSI Boy
Got a 25-pin SCSI cable and no place to plug it into your PowerBook? This little adapter fits into the palm of your hand and turns one end of a 25-pin SCSI cable into PowerBook-compatible HDI-30. $29. APS Technologies, 816/483-6100, 800/235-2753; fax 816/483-4459.

Wrap
You shouldn't take your PowerBook scuba diving, but if you buy this carrying case, you'll be covering your PB with neoprene, the material used to make wet suits. The benefit? You can operate the PowerBook without removing it from the case. The product features a shoulder strap and a rubberized handle. $79. Wrap Design, 408/253-5378, 800/883-9727; no fax.

BOOKS

The Mac User's PC/ The PC User's Mac
If you're working in a computerized office, chances are that you're switching between platforms more often than Batman changes his suit. This book helps Macintosh users learn DOS, and DOS users learn the Mac. Featured topics include file transfer and translation, as well as tutorials on several popular applications. Written by Elaine Marmel. 784 pages. $24.95. Hayden Books, 317/573-2500, 800/428-5331; fax 317/573-2583.

Stop Stealing Sheep
The title of this book comes from a quote by Frederic Goudy, American type designer, who said, "Anyone who would letterspace lower case would steal sheep." And if you understood that, you probably don't need this book. Luckily, previous typography experience is not required to understand this guidebook to type and how to use it. Written by Erik Spiekermann and E. M. Ginger. 174 pages. $19.95. Hayden Books, 317/573-2500, 800/428-5331; fax 317/573-2583. m

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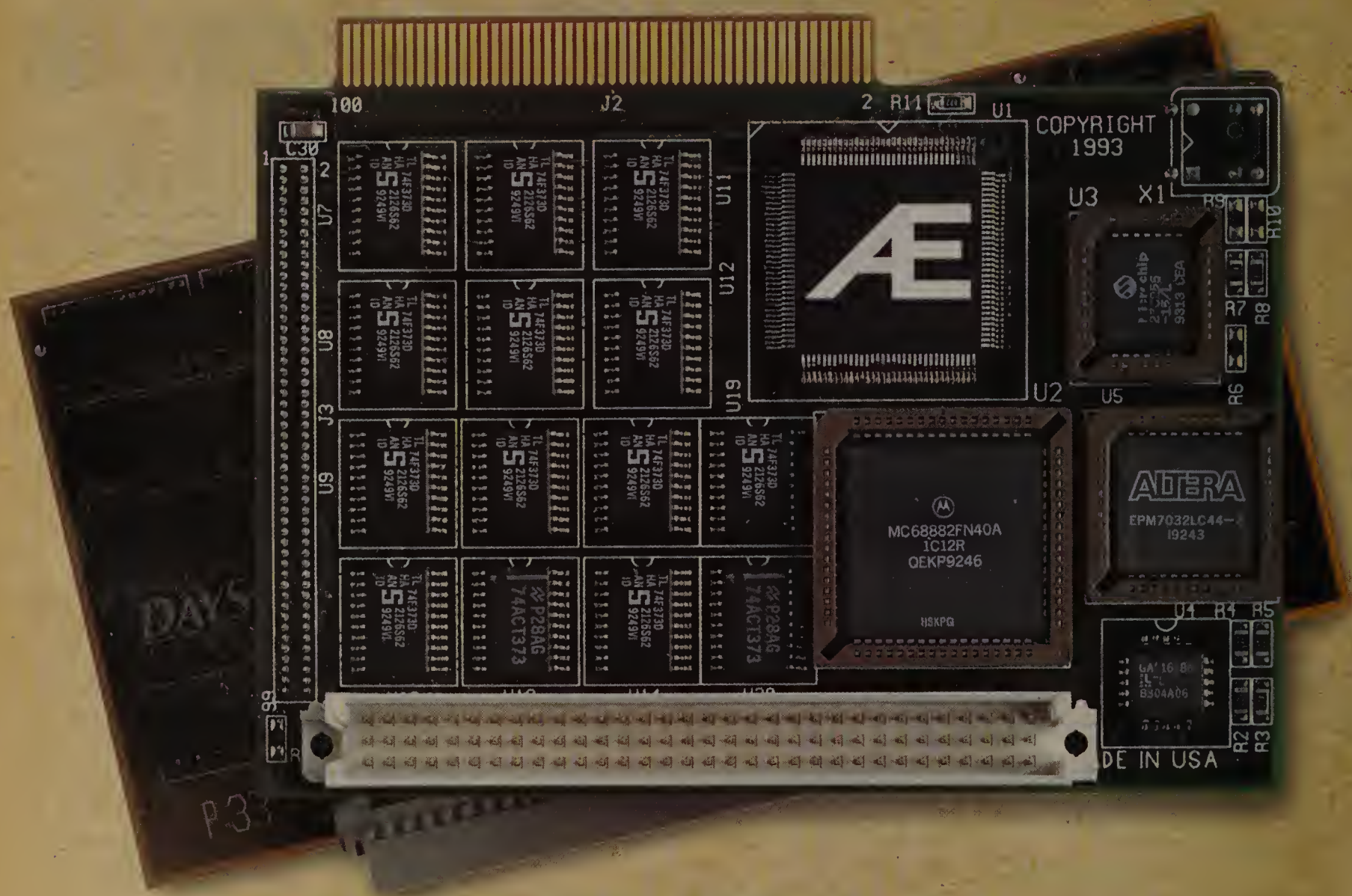

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Reviews

Lotus Notes 3.0

Workgroup Software

PROS: Well-organized, robust, and flexible business data system. **CONS:** Requires full-time application manager; requires PC-compatible server; Mac version doesn't support all Notes features. **COMPANY:** Lotus Development Corporation (617/577-8500). **LIST PRICE:** For each Macintosh client $495; OS/2 server $495.

MW ★★

PETER ALSBERG

SOME ANALYSTS FEEL THAT THE ultimate reason to have computers in an office is to facilitate workgroup interaction. In this vision, all of an office's computers are used together on a network with software that's part electronic-mail, part database, and part document manager. All company data then exists electronically, and is distributed, if necessary, across several sites and linked to any number of employees at remote locations; everyone in the company has, potentially, simultaneous instant access to all the company's information. Since Microsoft's Windows for Workgroups is unlikely to appear in a Mac version (and it's a limited, small-group program anyway), Lotus Notes is by default the premier example of workgroup software for the Macintosh. This version, 3.0, is the first Macintosh version of Notes, and it's a sophisticated product indeed.

File in Triplicate

LOTUS NOTES CONSISTS OF THREE SEPARATE modes: a messaging system that incorporates the best parts of Lotus's cc:Mail for Macintosh, a flat-file database facility with flexible forms-design capability, and a programming language for automating common tasks. Underlying all this is a communications architecture, most of which is hidden from end users and which makes great demands on the server operating system. The version we tested used a 66MHz, 80486-based server running IBM's OS/2 version 2.1 (it also ran, less satisfactorily, on a server running Windows 3.1); the communications architecture calls for true multitasking, not available in Apple's System 7.1. The real minimum memory for effective use of Notes, by the way, is 5MB rather than the 3MB stated in the documentation; and for reasons not clear, our installation was only successful on 68030 (as opposed to 68020) Mac clients.

The Notes E-mail system lets you set up categories, send to a variety of defined lists (companywide domains, groups within domains, personal), send messages at predetermined times, encrypt and decrypt messages, and easily incorporate different documents (spreadsheets, word processor files, graphics, sound) into a message. Individual users maintain their own address books with personal domain and group definitions, and the system administrator maintains an overall address book with its own security features.

The heart of Notes, however, is its database functionality. In the Notes vision, the company itself is envisioned as a set of flat-file, multiuser, distributed databases: employee records, customer orders, catalogs of products, marketing records, discussion databases of bright ideas, legal documents and contracts, accounts receivable, correspondence files, sales leads, patents, expense accounts, quality-control procedures—the works. Everything currently stored in that paper paradigm of the flat-file, the standard three-ring binder, should be converted into a Notes database. The system administrator then assigns an access level to each database for each employee: manager, designer, editor, author, reader, depositor, and no access. Once this has been accomplished, an employee with a

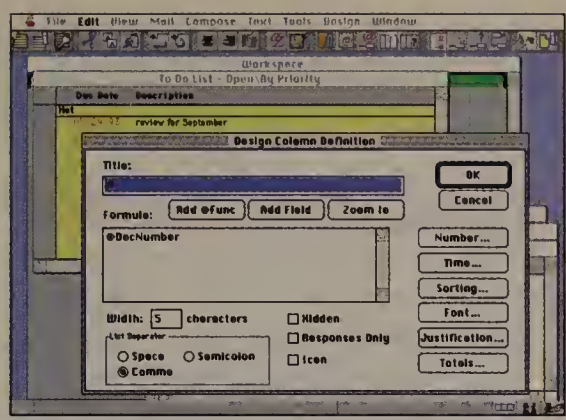
PowerBook in a motel in Waterloo, Iowa, has the same immediate involvement with the company's data as another employee on floor 25 of the company's Manhattan headquarters. In fact, the two of them can meet along with the company's industrial design group in Italy using a discussion database.

Notes gives administrators some sophisticated tools for coordinating database activities. Databases can be instructed to replicate themselves from server to server at set intervals, so that users at different sites see the same updated information. For the Mac, databases can also be replicated to the Mac client station, a feature you are likely to use (automatically, at night) if you're connected through a modem. Notes features full-text indexing and searching; not only does this make information retrieval flexible and fast, but it also minimizes server activity. (Indexing and full-text search are not possible, however, on Mac client databases, an annoying and not isolated illustration of the Mac's status as a poor relation in the Notes world.) In fact, server activities are quite cleverly managed in Notes—some installations with more than 100 connected users report that retrieval from server databases isn't significantly slower than in a 10-user system.

Getting Smart

ALTHOUGH NOTES HAS 120 ICONS THAT represent different tasks (the tool bar with 20 to 30 icons at the top of the Notes screen changes with different program modes), an effective Notes installation calls for programming still more icons, for a variety of tasks. Using Object Linking and Embedding (OLE) programming capabilities, an administrator can set up a link and attach an icon to it so that users can call up familiar applications from inside Notes. This is a key feature, since Notes is really a communications system without many internal capabilities for data reporting; if you want a bar graph, for example, to illustrate a point in a memo, you have to jump out to an application. Notes supports publish and subscribe, though, and you can cut and paste information in traditional Mac style, so that once your bar chart is in a document it can be automatically updated.

Administrators might also use icons for different views of data in a database, and then write macros to link the icons to views designed with Notes' generally excellent forms-design features. More macros might perform special lookup functions, helping users make efficient queries in the database. In Notes-speak, an *application* is most often a database with a set of views and some associated customized search routines. Writing an



Where It's @ Lotus Notes offers the "applications" designer (the applications are really databases with some automated functions) excellent forms-design capabilities with easy access to Lotus's time-honored @-functions.

application means planning the database structure and database views, and then coding macros using Lotus @-functions (see "Where It's @"). The @-functions—a macro-coding breakthrough when they appeared in Lotus 1-2-3 more than a decade ago—are a pretty primitive programming facility for a product-of-the-future like Notes. Nonetheless, the discomfort they impose on the programmers is paid back in relatively efficient execution, and longtime Notes sites have written impressive database applications.

Note This

NOTES VERSION 3.0 IS A PRODUCT WITH an unusually intelligent design: most of the challenges of making workgroup software really useful have been met by Lotus. In fact, Lotus has done Macintosh users a favor by releasing version 3.0 as Notes' first Mac implementation—not only was version 2.1 limited by comparison, but version 1.3 of OS/2 wasn't impressive as server software. Notes 3.0 is stable and robust, incorporates several years' worth of feedback from corporate clients, and costs less than earlier versions.

Despite these virtues, I have two misgivings about Notes. The first arises from the inherent complexity of preparing a Notes image of a company's information base. You might just as well leave copies of Think C on everyone's desk, with instructions to do something cool, as install Notes companywide without a coherent application scheme and a full-time Notes administrator, preferably one

continues

PAPER, WORK, AND GROUPS

Apple's Amber document architecture, when it arrives, will offer another way to implement workgroup software, but document-viewing applications that have already been released suggest ways to set up a paperless office right now.

If the idea of running an OS/2 server on a PC and writing database applications exclusively in macros seems somewhat daunting, you may want to consider the type of system you could implement with a little ingenuity and either Common Ground ($189.95, No Hands Software, 415/321-7340) or Adobe Acrobat Exchange ($195, Adobe Systems, 415/961-4400). These products let you view documents created in any application.

The key point is that the viewers don't need the original applications on their own Macs. Common Ground, for example, lets you distribute a Mini-Viewer (60K) with your documents so that they can be read, with original fonts, tables, graphics, and charts, on a Mac with nothing installed but the System. Acrobat does much the same thing, except that each Mac viewer must have a copy of Exchange to accommodate Acrobat's sophisticated handling of PostScript and compression, and documents easily cross the Windows/Mac boundary as well.

In both programs, you can select and modify text in a standard word processor (security settings let you control who can modify documents). This means that a salesperson with a PowerBook on the road can have access to customer profiles, forms, contracts, and related documents; and these documents look exactly as they would on paper at the home office. Similarly, workgroups within an office can set up complex multipart discussions, with individual workers contributing information from various databases, spreadsheets, and other specialized programs. Everyone in the workgroup can view all the contents of the discussion without having copies of the creating applications.

This approach to viewing documents requires some administrative discipline in document creation, formatting, and storage, but any effective workgroup solution requires discipline anyway. Historically, applications that most closely resemble paper models (word processors, spreadsheets, page layout) have proved easier for workers to understand, and have been more successful commercially than exotic software. The office of the future may turn out to be quite a bit like the office of the present, except that the "paper" will all be on a Mac screen.

with considerable programming skill. Somebody has to get all that information into Notes, assign the security levels for each employee and database, and do the hard conceptual work of formulating a useful information model of the company. Notes is easy to use, for end users at least; but without externally imposed discipline, a company's Notes system is in danger of growing into an electronic rat's nest of memos and junk databases. The up-front investment in software and the price of a 486-based OS/2 server are almost trivial compared with the number of dollars and hours a company can expect to put into an effective Notes implementation. In other words, kids, don't try this at home. If your company can't hire someone who's comfortable programming macros with @-functions, you'll miss most of the value of Notes. You might be able to find a Notes consultant who will design a custom Notes implementation for your company (the list of consultants is growing rapidly) and train your staff, but you'll want to keep the consultant on retainer for quite some time after installation.

The second problem arises from the changing Macintosh/PowerPC systems environment. When Apple delivers its Amber document architecture (see *News* in this issue), it will be possible to write very simple programs that implement all the best features of workgroup software and run on a Mac-based server. If you can wait until the middle of 1994 to start workgroup computing, you can expect more product choices. Notes is certainly a strong contender in any case, since it incorporates years of Lotus's workgroup-design experience, but a native-Mac workgroup program based on Amber will not be as resource-demanding as Notes and won't require you to invest in foreign hardware, an unfamiliar server operating system, and a new employee with previous Notes experience. In the large companies that are Notes' natural domain, 486 PCs and 32-bit PC operating systems and old Lotus or Symphony hotshots are ubiquitous; but for smaller, Mac-only firms, waiting for Amber is a credible alternative.

If you want to get started in workgroup computing right now, and have the resources to support a Notes installation, you should be happy that Lotus has done such a thoughtful job. If your needs aren't immediate, or if you are working with a smaller company without much cross-platform capability, you might want to wait and see what kind of workgroup software emerges from changes in Mac systems and document architecture over the next year or so.—CHARLES SEITER

PowerBook 180c

Notebook Computer

PROS: Active matrix color screen is sharp and has good color tonal quality. **CONS:** Battery life is short; performance is limited; price is high. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $4169 (4MB of system RAM and 80MB hard drive) to $4769 (4MB of RAM, 160MB hard drive, and internal fax modem).

MW ★★

A YEAR AND A HALF AGO, WHEN THE first PowerBooks were announced, nearly everyone wanted to know when the first color models would arrive. "We're working on them," Apple representatives said demurely. Then, five months ago the first color Mac notebook appeared, the disappointing PowerBook 165c. Only bargain-basement notebook vendors still used the 165c's passive matrix technology, which limits color fidelity and viewing angle. *Macworld* advised its readers to wait until an active matrix model came along. And now it's here. Should you wait any longer?

The screen is beautiful. In fact, its clarity and color fidelity are among the best I've seen on any notebook. And because it's active matrix, you can see the on-screen image clearly from almost any angle—you have to go as far off as 60 degrees to the side before the image fades into the liquid crystals.

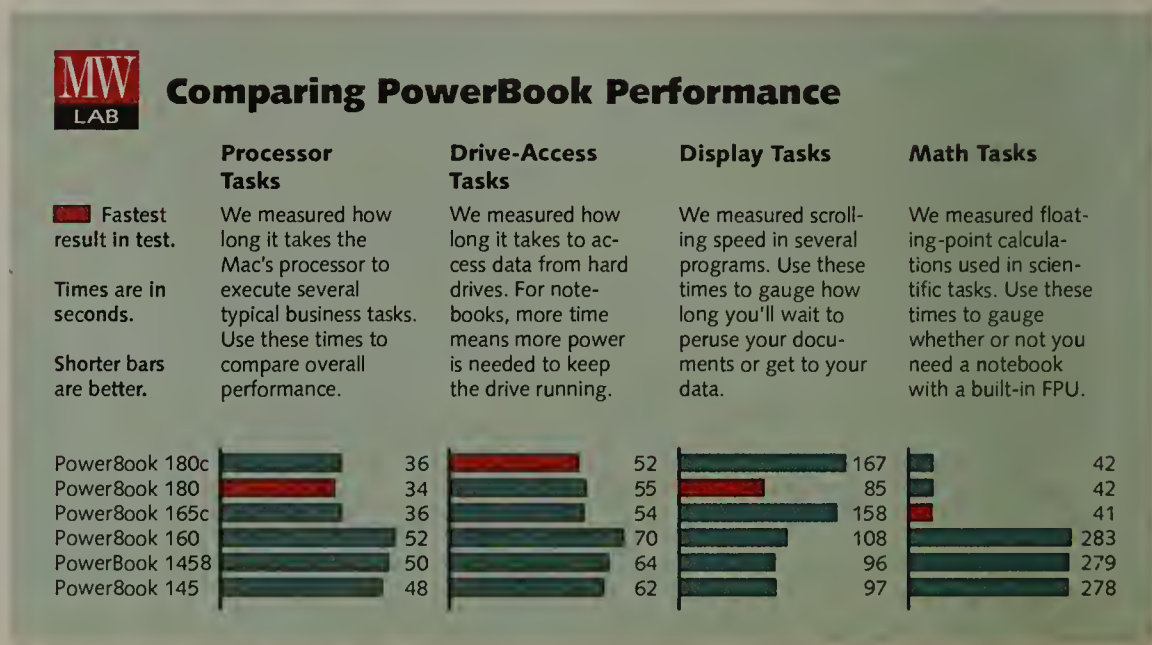
Despite this beautiful screen, I found the PowerBook 180c disappointing. The plain and simple truth is that the 180c is basically nothing more than a 160 or 180 with an active matrix color screen. Apple has added no innovations to this Mac, while almost every major non-Mac PC vendor has come out with innovative features that leapfrog the PowerBooks in significant respects.

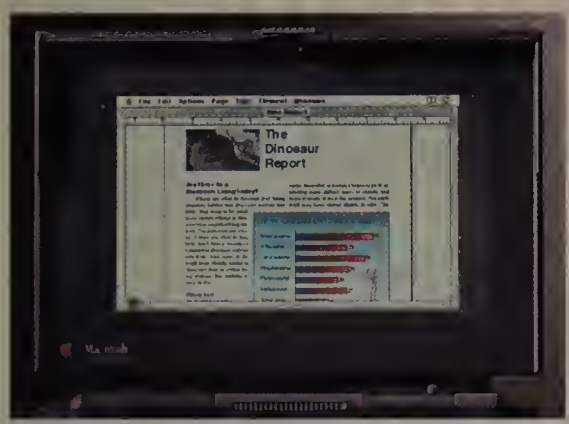
Color Screen Close Up

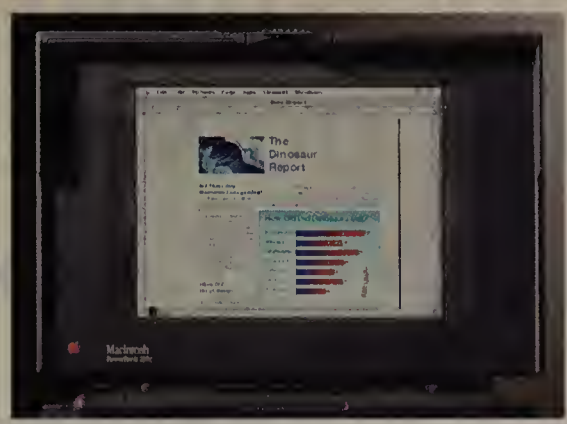
AFTER I GOT OVER THE SCREEN'S CLARITY, I realized how tiny it is—a mere 8.4 inches diagonally, or just 55 percent of a standard 14-inch monitor's active area. That means you get small pixels (94 dpi, rather than the typical 68 to 78 dpi found on a standard monitor). To put it another way, 12-point text appears the same as 9-point text. That's awfully small for sustained use, especially if you are using a program like Microsoft Word that does not let you magnify your working view. The screen is roughly the same size as the old Mac 12-inch monitor, but at 14-inch pixel resolution. It's smaller than any PowerBook screen before it. I found it a strain to use after just a few hours. There's very little brightness range in a 180c—the maximum setting is not much brighter than the midlevel setting. The top setting is necessary, however, if you're working in direct sunlight or bright indoor lighting.

This is *not* the state of the art. *Macworld* looked at several other notebooks for comparison (see the photos in "Color Screens Compared"). The IBM ThinkPad 720C, which is lovely to behold and use, has a large (10.4-inch, 76-dpi) screen. Even a typical notebook like the Toshiba T4500C (not pictured), with its moderate screen (9.4-inch, 84-dpi), is better—that extra inch translates to a visible difference. They're both proof that Apple could do better.

Two other display notes: First, there is no contrast control. You have to use the brightness slider to adjust the image contrast (positioning the slider to the middle gives you the maximum contrast by







PHOTOGRAPHS BY PAUL FRANZ-MOORE

Color Screens Compared The PowerBook 180c screen (middle) has better color fidelity than the 165c's (left). But both PowerBook screens are small compared to typical non-Mac notebooks, resulting in hard-to-read text. Compare these screens to the IBM ThinkPad 720C (right), which uses the largest LCD panel available. (The flat gradation in the IBM's image is due to the EPS preview generated by CorelDraw, the illustration program I used to create the chart, not to the notebooks' color capabilities. All three notebooks shown here support 8-bit color.)

reducing excess brightness, which washes out the dark colors, but retaining enough brightness to make the light colors contrast with the dark ones). Second, change the screen's color gamma from Active to Uncorrected (in the Monitors control panel, hold the option key when clicking on the Option button). That makes the colors more vivid. (Apple's standard gammas tend toward blue—thus the signature "Mac blue" color—which can make colors seem duller.)

Power Drain

ONE REASON THAT APPLE WAITED TO deliver an active matrix color notebook is that these screens take a lot of power. And since Mac notebook components generally take more power than comparable notebooks, that meant Apple risked a notebook with a battery life of next to nothing. With the 165c, Apple tested that risk, and Macworld Lab tests showed that the 165c's battery life under continuous use is about 75 percent that of the gray-scale 160. The 180c's power consumption has the same ratio compared with the 180's.

Macworld Lab tests rate the PowerBook 180c's continuous-use life at 60 minutes. That matches my tests during moderate work (editing a series of files): 63 minutes on a full charge and 45 minutes on a 2-hour charge. (I set the battery-management feature three-quarters of the way toward maximum conservation. The screen brightness was near the maximum.)

Make sure you have a spare battery, and be thankful both that Apple designed several warnings into its power-management software to alert you to imminent shutdown, and that the PowerBook uses the last trickles of battery power to save the contents of your RAM until you can plug the PowerBook into an outlet and save your work. (Do not change batteries until you've saved your work—the contents of RAM will be lost as soon as the power source is lost.)

The higher power-usage comes from the power-hungry components inside. Apple has added color-handling circuitry and faster CPUs (the 180c uses a 33MHz 68030), which take more power and generate more heat. The 180c is the hottest PowerBook I have used—I do not recommend using it for long on your lap if you are wearing shorts or a skirt (seriously).

Lagging Leader

EXCEPT FOR THE ACTIVE MATRIX screen, the PowerBook 180c is the same as the other second-generation PowerBooks (160, 165c, and 180—those with built-in video). The benefits are the same: built-in trackball, power-management software, built-in video, and standard Mac ports (except for SCSI, which is the PowerBook-only 30-pin version that requires an adapter).

The 180c's 33MHz 030 (the same as in the 180) provides adequate performance, but after working on a Centris 610 (which uses a 20MHz 040), I noticed a difference. This is partly because of the slower processor (today's 040's take too much power for use in a notebook), and partly because an LCD screen takes longer to update than a standard monitor does, so scrolling can bring the Macintosh to a crawl.

Because the 180c is essentially the same as previous PowerBooks, my complaints about those hold here as well: the lack of page-maneuvering keys like the page-up key, the absence of status lights, and a line formation for the arrow keys (instead of an inverted T shape); the fact that users cannot install modems and memory themselves; the nonstandard keyboard spacing; and the lack of support for PCMCIA expansion cards. (Apple has said it is likely to implement PCMCIA slots in future versions, after the next-generation PCMCIA standard that improves the data-transfer rate is defined.)

Apple has lost the technology lead in notebook computing. The enhancements made since the release of the 100, 140, and 170 in October 1991 have been incremental, like adding color, or remedial, like adding video-out ports. Apple's design and battery-management features revolutionized notebook design. But now the other major notebook vendors have copied Apple's innovations and extended them while adding new features of their own. You can get notebooks that offer fast, low-power processors (like the 25MHz 486SLC) that rival a Centris 650's performance. You can get notebooks with a bay into which you can put either a pop-out floppy drive or a second battery so you have enough power for use on a plane trip. You can get notebooks whose screen and other components can be snapped out and upgraded—by a user.

It was very telling that when *Macworld* editors and designers saw the PowerBook 180c and the IBM ThinkPad 720C, it was the ThinkPad that generated the enthusiasm and interest. (And analysts say that the PowerBook, which took the lead in the notebook market in its first year, has now fallen behind the ThinkPad in sales.)

PC makers need to substantively revise their offerings at least once a year to stay competitive. They also need to keep prices competitive. The IBM ThinkPad with a 120MB hard drive, which easily outperforms a 180c, costs $4350. The equivalent configuration of the 180c costs $4769 with a 160MB hard drive, $4379 with an 80MB drive.

Apple has no competition, so it doesn't face these pressures. That's too bad for Mac aficionados who want to stay with the Mac while not falling behind the rest of the computing world. So should you wait any longer to buy a color Mac notebook? Yes, unless you really need color. Get a 180 instead if you want a crisp display (and a 10-inch screen), or the fairly inexpensive 145B if your usage will be sporadic and the passive matrix screen's dullness won't be a big headache.

—GALEN GRUMAN

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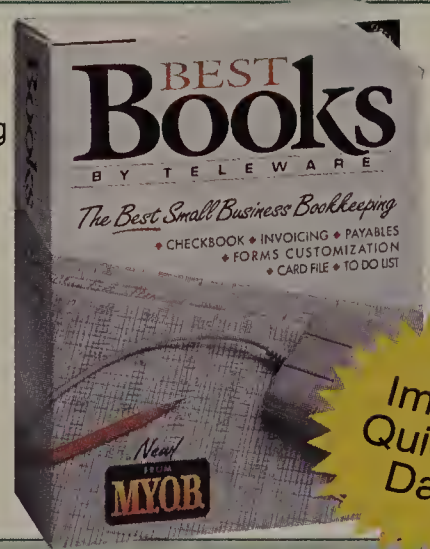

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PowerDraw 4.0

2-D Drafting Program

PROS: Now includes externals, parametric symbols, and sheets. **CONS:** Programming necessary to build macros. **COMPANY:** Engineered Software (919/299-4843). **LIST PRICE:** $795.

MW ★★★★

ONE OF THE FIRST FULL-FLEDGED Macintosh drafting programs, PowerDraw has consistently ranked among the best—often against competition costing hundreds of dollars more. PowerDraw 4.0 adds parametric symbols, guidelines for aligning objects, enhanced snapping capabilities, support for TrueType fonts, multilayer editing, and sheets for managing layer attributes.

However, PowerDraw 4.0's best new feature is an open architecture that supports *externals*, program modules like the plug-ins found with many graphics programs. Externals let you customize PowerDraw with application-specific tools, floating palettes, and menu commands, as well as optimize performance by using only the tools you need. Also, externals provide a mechanism for third-party developers to add new functions.

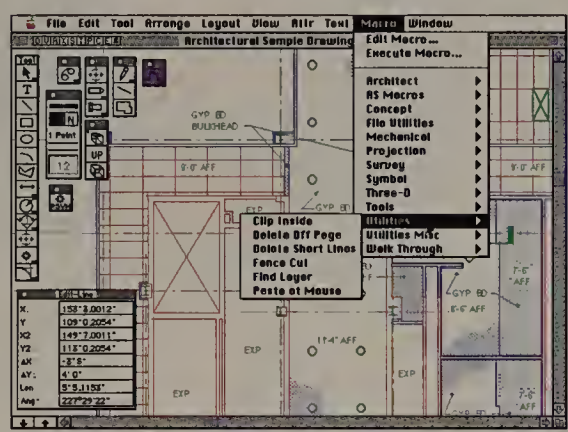
PowerDraw 4.0 comes with a good assortment of externals. New tools, such as draw by center polygons and a survey dimensions tool that produces distance and bearing measurements, are pop-ups on the basic tool palette. Other externals, such as architectural tools that cut and heal walls when inserting windows and doors, are displayed in floating palettes.

A mechanical-drawing palette includes tools that draw centerlines, tapped holes, hex nuts, and S-breaks for pipes and shafts. Another palette holds several 3-D tools that let you establish vanishing points and draw lines and objects in 2-D perspective. A third palette offers pixel tools that produce editable bitmapped objects. Unfortunately, these painting tools are limited, and you can only ascribe one color to the object—then again, this isn't a paint program.

You can have PowerDraw load externals automatically at start-up, or you can load them individually with the Load External command, which is itself an external. And therein lies the beauty of modularity: externals can be anything, making expandability a snap. In version 4.0 the PowerDraw Translator, a separate file-translation utility, has been converted into externals. The Translator externals, including DXF, EPS, ClarisCAD, MacDraw, and HPGL, cost $249 each (from Engineered).

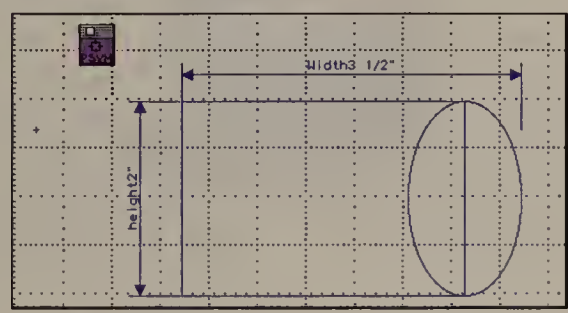
Also available are two volumes of advanced drafting tools, including such niceties as an insulation fill tool for architects, an intersection tool that trims the ragged ends of crossing lines, palettes with baseline and isometric tools, and a laser printing utility. Each volume sells for $79. Engineered Software also publishes a developer's kit ($100) that enables users with programming skills to build their own externals.

PowerDraw 3.0 users will recognize many externals, such as the architectural and arc tools, from their previous lives as macros. Although overshadowed a bit by externals, PowerDraw's macro capability has been retained. PowerDraw's built-in Pascal-like language is documented in the manual but, of course, writing macros is programming. A function that simply records drawing sequences as macros would be a good addition. PowerDraw 3.0 macros work with version 4.0.



External Power Source Plug-in external tools, like the highlighted architectural palette, and macros let you customize PowerDraw 4.0 for application-specific drafting tasks.

PowerDraw's symbol libraries are accessed in windows that display their contents by name and thumbnail. You can open several libraries simultaneously, and their windows remain available for multiple selections. With PowerDraw 4.0, you can rotate and flip symbols before placement and globally replace symbols in a drawing.



Symbolic Action You can alter PowerDraw 4.0's parametric symbols simply by changing their associated dimensions before placement.

Best of all, PowerDraw 4.0 builds parametric symbols that can be edited by altering their associated dimensioning. The parametric symbol tool (another external) queries you for dimensions before placement. You can even alter distances between the components of a symbol. To transform standard symbols into parametric symbols, you have to reconstitute them with dimensions—a small price to pay for a great feature.

Extensive symbol libraries for architecture, landscaping, and mechanical applications are available separately for $79 each (also from Engineered). No parametric symbol libraries are currently available.

PowerDraw 4.0 also introduces *sheets*, a wonderful way to manage drawing layers. Sheets allow you to save various combinations of layer attributes, specifying which layers are active, which are visible, and which are grayed. Then, instead of changing attributes manually when you need a different layer configuration, you can move from one sheet to another with a single command—like changing styles in a word processor. Sheets are slick.

PowerDraw 4.0 also has the ability to select adjoining objects along a path in chain-reaction fashion, or to select all objects completely enclosed by another object. The program's snapping tools let you align objects to specific points on other objects. The new Preferences check box overrides active-layer settings and lets you edit across layers. And PowerDraw now converts TrueType fonts to Bézier outlines. Its excellent dimensioning capabilities and its extensive, built-in plotter support, are both holdovers from previous versions. It's a long feature list.

A clean, well-implemented interface, derived from MacDraw conventions, makes PowerDraw 4.0 easy to learn and a pleasure to use. The revised manual (expected as we go to press) will add some tutorial exercises to an already well-organized and informative core.

Always one of the fastest CAD programs around, PowerDraw 4.0 remains quick and responsive. I wouldn't recommend using it on anything less than a midlevel Mac, but PowerDraw even ran—albeit slowly and with cramped visuals—on my heirloom Mac Plus. On a IIfx, PowerDraw gets up to a nice gallop.

PowerDraw 4.0 lacks some high-end features, such as the ability to open reference files within a document. But speed and versatility more than offset any omissions. Refined and polished, PowerDraw 4.0 is a wonderful program and an excellent value.—CARLOS DOMINGO MARTINEZ

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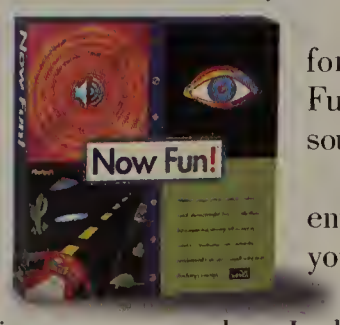

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Removable-Cartridge Drives

DataPak 105

PROS: Faster than many fixed hard drives; lifetime warranty for preformatted cartridges. **CONS:** Not compatible with existing SyQuest removable formats; drive tends to slide around when you insert and remove cartridges. **COMPANY:** Mass Microsystems (408/522-1200). **LIST PRICE:** Internal drive $949, external drive $1049; unformatted cartridge $122, formatted cartridge $139.

MW ★★★★

Infinity 105 Turbo

PROS: Faster than many fixed hard drives; diminutive design ideal for use with PowerBooks. **CONS:** Not compatible with existing SyQuest removable formats; flimsy power cord; lacks power-on light. **COMPANY:** Peripheral Land Incorporated (510/657-2211). **LIST PRICE:** Internal drive $795, external drive $894; unformatted cartridge $88, formatted cartridge $98.

MW ★★★★

IF YOU'RE STILL DECIDING WHICH removable-drive format to go for, SyQuest has made it more confusing for you, with its new line of 105MB removable-drive mechanisms. It wasn't long ago that the fastest removable device out there was the Iomega Bernoulli MultiDisk 150 (see *Reviews*, *Macworld*, June 1993). The new 105MB SyQuest products have eclipsed the Bernoulli in performance, with access and transfer speeds that beat many small and medium-size fixed hard drives. The first 105MB SyQuest products to reach *Macworld* are the Infinity 105 Turbo from PLI and the DataPak 105 from Mass Microsystems.

The SyQuest 105MB mechanism is a 3.5-inch device, very much like the mechanisms in the current generation of fixed hard drives. The cartridges themselves are correspondingly small and light, though packaged in a box that's as thick as the older 5.25-inch variety. To pack more data into a smaller space, SyQuest has increased information density. Because data is stored in a smaller space on the cartridge, seek speeds are sharply improved, to less than 15ms, and read-write transfer rates can be expected to run faster, at 1400K per second and higher.

SyQuest claims the new mechanisms and cartridges are also more rugged than the earlier products. While they withstood seven-day-a-week operation and constant swapping during the testing period, I wouldn't subject these cartridges to the same sort of abuse as a Bernoulli disk. The life span of the new mechanism is rated at 100,000 hours, up from the 60,000 hours of the latest 88MB devices.

Unlike the larger, older mechanisms, the 105MB unit includes automatic head-parking, which prevents damage to the expensive medium if the drive loses power or is turned off with a cartridge still inside. The cartridge is locked inside the mechanism when power is switched off, but you can extract it if you stick one end of an unbent paper clip inside a hole located just above and to the right of the drive's activity light.

The new SyQuest cartridges are readily available now, priced about halfway between the 44MB and 88MB cartridges. While not quite as cheap as an optical disk, they pack a lot of bang for the buck.

The drive mechanisms of the DataPak 105 from Mass Microsystems and the Infinity 105 Turbo from PLI may be the same, but the two manufacturers have gone off in sharply different directions in executing their new products.

Both firms provide good, toll-free technical support, a decent no-frills cartridge-formatting package (Mass Microsystems' formatter is limited to removable cartridges), and a free utility package of some sort. Both products' formatters could benefit by providing another level or two of warning dialog boxes before formatting begins.

Mass Microsystems DataPak 105

THE MASS MICROSYSTEMS DATAPAK 105 IS designed for vertical or horizontal use. The only obeisance made to the smaller drive mechanism is a case that's somewhat narrower than the standard zero-footprint design. The rear of the hard plastic case includes a pair of 50-pin SCSI jacks, an on/off switch, SCSI address switches, and a power-cord socket. Two removable support brackets are attached to the drive to allow for vertical operation. Although it's not mentioned in the manual, two more supports were found in the shipping box; they're needed for conventional horizontal use. Indentations at the top of these brackets make it easy to stack a set of DataPak drives.

Mass Microsystems provides two decent instruction manuals, a set of 25-to-50-pin SCSI cables, and a plug-in SCSI terminator block. Installing the drive is fast, and the manual includes a set of troubleshooting tips. You also get a copy of 7th Heaven, a set of System 7 utilities from Logical Solutions.

The only problem I had was using the drive in the vertical mode. The support brackets are made of a smooth plastic, and the drive tended to slide back and forth on my worktable whenever I tried to insert or remove a cartridge. The exhaust fan is a bit noisy, but I got used to it quickly enough.

Infinity 105 Turbo

PLI TAKES BEST ADVANTAGE OF THE SIZE of the new 3.5-inch SyQuest mechanism by providing a case that's barely larger than the mechanism itself. It comes without an exhaust fan and cools by convection, with ample vents at either side of the drive. To conserve space, power-supply components are shunted off to the AC plug itself, which is basically a 7.5-volt-to-110V converter. The plug assembly looks like the kind that comes with a portable cassette recorder, and the flimsy power cable seems out of place in a product of this price and quality. PLI doesn't include a power-on light, and the drive is so quiet that you sometimes barely know it's on unless the drive-activity light is flashing.

The case is sturdy. In addition to the usual pair of 50-pin SCSI jacks, PLI uses a conventional on/off switch, switchable termination (a plus), and a convenient SCSI ID wheel.

PLI gives you a manual for the drive and one for the formatter. Installation was easy and trouble-free. The installation manual is brief, but it should be informative enough even for novice users. In addition to the 25-to-50-pin SCSI cables, PLI adds a copy of an information organizer program, Data-Areas, from numa Technology. A carrying case is offered as an optional accessory ($54).

The Envelope, Please

BOTH PRODUCTS ARE WELL BUILT AND worked flawlessly. The lingering question marks are the longevity of the lightweight cartridges SyQuest uses for these products, and the longevity of the format itself. The biggest drawback to the new format is that it doesn't support the existing base of 44MB and 88MB users. If I had to choose between the two drives, I'd pick the smaller, lighter, quieter, cheaper PLI. It's ingeniously packaged and ideal for both desktop and PowerBook use. PLI doesn't give the all-encompassing warranty on its cartridges that Mass Microsystems offers, but you could always buy the latter's removable cartridges instead.—GENE STEINBERG

Orchard News

Vol. 3, Issue No. 7

Apple Trees Bear Fruit For 50 Years

Focus On Color

Color is the key to picking fruit at its peak. Bright reds, yellows, greens, or oranges tell you that harvest time has arrived.

Apple trees will bear fruit after approximately four years and will continue to do so for about fifty years. Apples are now grown twelve months out of tha year in temperate latitudes of all continents. Until the early 1900's apples were not in season during the summer months. A breakthrough in the 1940's at Comell University Agricultural College with controlled atmosphere storage extended the growing season year-round.

Left alone an apple tree will yield a large crop one year and few fruit the next. The apple tree voluntarily sheds some apples, but to truly counteract this effect orchardists thin their trees each spring. This thinning is done by spraying chemicals that damaga about half of the trees blossoms. A chemical that is already registered by the Environmental Protection Agency for use on other crops can likely be a safa and effective spray. Several of the tested products have been found to effectively damage apple flowers so that they cannot be pollinated. This can be done without harming bees, which are responsible for the pollina-

Continued pg. 6

$60 Film & Separation cost — The Microtek 45t scanner*

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$1,105 Film & Separation cost — outside pre-press house**

Apples vs. Apples

Until now, your high-quality color scans for publication and four-color printing were usually done on expensive drum scanners. Owning and maintaining this type of equipment was not an affordable option.

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Circle 146 on reader service card

Two Icon Editors

Utilities

Icon 7

PROS: Simple, straightforward design; launches automatically from within Get Info window; includes text tool; convenient library feature. **CONS:** Nonstandard paint tools; paltry icon library included. **COMPANY:** Inline Design (203/435-4995). **LIST PRICE:** $79.95.

I Like Icon

PROS: Impressive library of eye-catching icons; work palette provides easy access to frequently used icons; lets you create animated icons using QuickTime. **CONS:** Animated icons lack practicality; custom icons often don't appear without rebooting; no text tool; sketchy documentation. **COMPANY:** Baseline Publishing (901/682-9676). **LIST PRICE:** $59.95.

OK, YOU DON'T REALLY *NEED* SPECIAL software to create custom icons for your files, folders, and disks; any graphics program provides the raw materials. But using a specialized icon editor makes this task a lot easier—and a bit more fun—by providing a working environment specifically designed to create 32-pixel-by-32-pixel works of art.

With Baseline Publishing's I Like Icon and Inline Design's Icon 7, you get all the tools you need to create unique icons and to catalog and organize your favorite designs.

I Like Icon

TO EDIT AN EXISTING ICON USING I LIKE Icon, just drag it onto the I Like Icon application icon. This launches the program and opens the Editor window, which provides a close-up view of the icon for pixel-by-pixel editing with a variety of painting tools.

The program gives you a choice of several color palettes: two versions of the standard 256-color palette; a 16-color palette; and the Apple Icon Colors palette, which has only the 34 colors Apple recommends for high-quality color icons that highlight correctly.

Like most icon editors, I Like Icon lets you edit an entire icon family, which consists of both the large and small versions of an icon in 8-bit color, 4-bit color, and black-and-white. You can edit each icon family member by clicking on it. You get a decent selection of basic painting tools in the editor, but a few practical features are lacking. You can't change the width of lines created by the paintbrush and line tools; and there's no text tool.

After creating an icon you can save it and return to the Finder to see it in use. In most cases, you'll have to restart your Mac to make the icons visible. (The manual warns that *occasionally* you might have to restart, but I found it necessary to do this almost every time.)

The program has some outstanding features for organizing and saving works of icon art. The Browse window lets you group related icons together in a single window and store them as one file. On the Work palette you can store up to nine frequently used icons for easy access.

Along with the program you get a great collection of ready-to-use icon art. Scores of icons range from an image of a half-eaten doughnut to scanned photos of the program's creators.

For the truly icon-obsessed, I Like Icon lets you link mini QuickTime movies to specific files, creating animated icons that play when clicked on (and can even play recorded sounds). You assemble animated icons frame-by-frame using the program's Mini-Movie Maker. A generous supply of sample minimovies is included with the program disks. The animated icons are cute but completely impractical. For one thing, you activate them by clicking on them once; this action doesn't open a folder or launch a program—it just leaves you sitting there, watching the animation. The novelty wears off quickly. If you double-click on an animated icon, the minimovie only slows down the action you want to accomplish. Moving animated icons is also a problem, because as soon as you release the mouse button the movie plays.

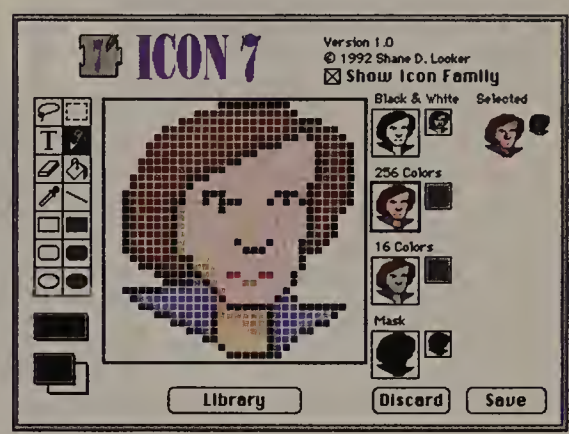
A final complaint: I Like Icon's manual, though written in a lively style, is sometimes less than enlightening: there's no index; the significance of the Icon ID numbers in the browse windows is never adequately explained; and some program features, such as the options in Save dialog boxes, are completely ignored.

Icon 7

ICON 7 IS MUCH SIMPLER AND LESS GLITZY, but in many ways it handles jobs more cleanly and efficiently than I Like Icon.

The program consists of a single system extension that integrates seamlessly with System 7's Get Info windows. To edit an icon you open the Get Info window and double-click on the icon in it. This opens Icon 7's Editor window (with the selected icon ready for editing) and adds an Icon 7 menu to the Finder's menu bar, thereby providing access to the program's special editing features.

The King of Icons "Elvis, Fatter" is one of the dozens of wild and wacky icons ready for editing in I Like Icon's library of custom icons.



A Star Is Born Using the drawing tools in Icon 7's Editor window, you can make your System Folder look like Neil Diamond—or anyone else.

Icon 7's editing area is somewhat smaller than I Like Icon's, and its tools are even more limited. There's no paintbrush; line widths can't be changed; and most irritating, the shift key doesn't constrain the pencil to drawing straight lines. Still, Icon 7 does include a text tool with which you can add text in any available font and style, in sizes up to 18 points.

As with I Like Icon, you can work with a full 256-color palette or just the 34-color Apple Icon Colors palette.

Once you've edited an icon, clicking on the Save button closes the editing window, quits Icon 7, and returns you to the Get Info box, where you can see your custom icon pasted in immediately—no need to restart your Mac.

To open an Icon 7 library, you click on the Library button in the Editor window. This replaces the editing area with a scrollable window of icons; click on an on-screen button to transfer any of the library icons into the editing area for use.

Unfortunately, Inline Design gives you little to get started with in the way of an icon collection. With more icons, Icon 7 will be a great customizing tool.

—JOSEPH SCHORR

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Two Backup Programs

Backup and Archiving Software

Retrospect 2.0
Retrospect Remote 2.0

PROS: Improved user interface; improved network backup speeds; improved scripting.
CONS: Can no longer select most recent version of a document for backup. **COMPANY:** Dantz Development Corporation (510/849-0293).
LIST PRICE: Retrospect $249; Retrospect Remote (ten users) $449.

MW ★★★★
Retrospect 2.0

MW ★★★★
Retrospect Remote 2.0

DANTZ DEVELOPMENT CORPORATION has upgraded its backup and archiving program with a new user interface and better performance. Retrospect works with virtually all backup media, from the lowly floppy disk to removable media such as SyQuest, Bernoulli, and magnetic optical cartridges, and also supports nearly every tape backup drive ever released for the Macintosh. Many tape drive manufacturers bundle Retrospect with their hardware. In addition to backup, which makes a safety copy of data from a hard drive to a secondary storage medium, Retrospect also excels at archiving, where the data is first copied to the secondary media, then erased from the source disk, in effect moving the data from online to offline storage. If you're backing up a small amount of data to floppy disks and don't need to archive files, you'll probably be better served using Dantz's DiskFit Pro, rather than Retrospect.

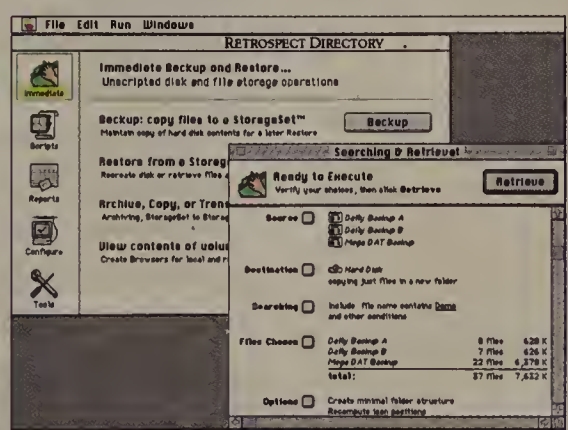
One of the main complaints about previous versions of Retrospect was the large number of backup, file-cataloging, and restore options that were available, coupled with a complex interface that required you to navigate through many windows to complete a backup or restore. Dantz has made accessing the basic functions, as well as the more advanced features such as automated backup schedules and scripting, much easier in version 2.0 (see "One Step at a Time"). All of the program's functions are accessed through the Directory window, which splits the program into five areas, each represented by an icon. Clicking on one of the icons displays a list of buttons with a related function. For example, under the Scripts icon, there are buttons to Edit, Run, Check, or Schedule a script.

Scripts in Retrospect 2.0 have been greatly improved. You can now combine many backup or archiving strategies into a single script. For example, you can have a script that backs up three users to one set of tapes every other day, and to a monthly backup set on the second Monday of every month. A summary window lets you view and edit the backup schedule, and a new Script window lets you see the entire script, thus making it easy to modify just a part of a script.

Selectors—a feature that lets you choose files and folders for backup or restore based on a set of criteria—have been completely revised since version 1.3, the prior version of Retrospect. A single window lets you define the criteria for file and folder selection in plain English (for example, "Find files containing 'demo' OR files with a modify date before today"). You can use the logical operators AND and OR to create complex Selectors, and you can now save any number of custom Selectors; Dantz provides some standard Selectors with the program.

Dantz Development has also improved the reporting capabilities of this new version of Retrospect. The Detail Log provides a blow-by-blow report of everything that happens during a backup or restore, and the new Backup Report gives an overview of all volumes (local or remote) backed up, how long the last backup took, and the script used to execute the backup on each volume.

Retrospect Remote is an add-on that allows backup of networked Macs to a central Mac on the network with a backup device such as a tape drive. File-sharing software is not required; you only need to copy the Remote control panel onto each client Mac. Dantz uses serial numbers that are licensed to Remote users. The backup administrator activates each Remote from the backup machine by using the Retrospect application. The administrator needs to type in the ten-digit serial number for each Remote client from a list provided in the Retrospect Remote package. This can be a real chore if you have many Remote users, but it only needs to be done at the initial setup of Remote.



One Step at a Time Retrospect's new interface is much easier to use. In the Searching & Retrieval window shown, you can see at a glance where the files I'm retrieving from tape are coming from (the tape names next to Source), where they're going (to Hard Disk), what the search criteria were, and how many files will be retrieved.

Retrospect Remote worked flawlessly, backing up workstations and AppleShare file servers automatically. Remote backup and especially backup verification is significantly faster. Verifying a backup now takes half the time it took with version 1.3. In my tests, on a 10BaseT Ethernet network with four users and an AppleShare 2.0 server, I backed up using an Archive Python DAT drive and Retrospect 2.0 running on a IIci. The total amount backed up was about 260MB. Backup and verify time using Retrospect 1.3 was approximately 4 hours and 50 minutes. A similar backup using version 2.0 required approximately 2 hours and 30 minutes, due mainly to much faster verification. In other words, backup is a little faster; verifying the backup is a lot faster.

Remote users can now be notified when a backup has been completed, and also when a backup *hasn't* occurred; no details of files unsuccessfully backed up are sent to the Remote user, though they are logged at the backup Mac.

Version 1.3 allowed you to select files for a restore by selecting only the most recent version of a file; unfortunately, Dantz removed this useful feature in version 2.0. This feature was especially important for tape backup users, because a DAT tape that has been used for backup many times can contain several chronologically different versions of a given file. A Dantz spokesperson said that the company expects to return the Only Most Recent selector to the program in a future update.

In several calls to Dantz technical support, I found them to be knowledgeable and friendly. The Retrospect 2.0 manual has been rewritten and is much better than previous efforts.

Retrospect 2.0 is a powerful program that works well for all levels of users. It can easily back up an individual Mac, and with very little effort can protect the data of dozens of networked users. For backup and archiving, there's nothing better.
—TOM NEGRINO

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SafeDeposit 1.2

Backup Software

PROS: Easy setup; automatic server log-on, backup, and log-off; real-time mirroring feature; backups saved in Finder or DiskDoubler format. **CONS:** Slow backups; requires DiskDoubler for compression; if additional disks not inserted, backups may abort; RAM hungry. **COMPANY:** Dayna Communications (801/269-7200). **LIST PRICE:** $189.

MW ★★

SAFEDEPOSIT ATTEMPTS TO TOTALly automate the sometimes tedious process of making safe, reliable backups. It consists of an application and extension. When you first install and open the program, you are interviewed about your basic backup plan. You tell the program where you want to store your backups, when you want them done, how the backup is to be performed, and what items you want to back up.

Each step provides you with a host of choices (which you can add to or change later). Backup locations can include another hard drive; removable media, such as a floppy disk, cartridge, or optical disk; or any other device that can be mounted on the desktop, including a networked file server. The file-server option lets you specify the location of the server, and allows you to store log-on/log-off information, so the process can be done behind the scenes. Choices for when to back up include later (a scheduled backup); continuously as you work—a way to "shadow," or mirror, your work; on command; on shutdown; and on disk insert. You also have the choice of whether or not to compress files, whether to back up open files, and whether backups should be full or incremental. By default, your initial backup is a full-blown process.

You can append additional lists of items for backup (Dayna calls them "queues") to the SafeDeposit application by opening the program or, for System 7 users, by dragging and dropping. You can also customize the settings for each item in the queue. The extension keeps track of all the variables—which would be a complex process if you had to do it all manually.

Unlike many backup programs that create files in a proprietary format, SafeDeposit saves in Finder format or (optionally) in DiskDoubler format. If the application is not available or is damaged, you can still restore your files.

SafeDeposit could be the last word in automated backup. But there are some serious flaws that have to be fixed first.

First, backups are slow compared with those of other programs. As a test, I backed up a half-filled Quantum 240MB drive to two SyQuest 88MB removable cartridges. The process, creating uncompressed backup files and with time for one quick cartridge change, took about 25 minutes. The compressed backup took about 50 minutes. In order to get SafeDeposit to run at this rate, I set its file buffer to 512K. With a standard file buffer of 32K, SafeDeposit is even slower. With the higher buffer setting, the amount of RAM gobbled up by the extension increased from around 500K to nearly 900K. In contrast, I backed up the same files using Fifth Generation Systems' FastBack Plus 3.0.1, and the whole process, using FastBack's tightest compression method, took a little over 17 minutes (if I had used the faster method, it would have taken several minutes less).

The process of unattended backups is seriously compromised by SafeDeposit's annoying habit of aborting a backup if it runs out of disk space. Although there is a dialog box that tells you to insert another disk to continue the backup, the warning consists of a countdown (30 seconds by default, but you can set the countdown to run for longer periods). If you don't catch the message in time—and you're hardly likely to if you're not present during the backup—your only notification that something went wrong is a sad-face icon in the SafeDeposit application. Each time I tried to continue a backup, the whole process started from scratch.

Dayna's technical-support people were still being brought up to speed on SafeDeposit when I telephoned them. Support is a toll call, responses are quick, and the support people were always friendly. But I was promised callbacks on complex questions that never came.

SafeDeposit's shadowing technology could also use some help. It works, but if the backup disk isn't mounted on your Mac when you are working with files slated for real-time backup, there's no request to insert the missing disk. You could work happily along, have a crash or other mishap, and then find that the valuable work you expected to be backed up just isn't there. (Once the disk is mounted, however, the warning notices do appear when the disk is dismounted.)

SafeDeposit has a number of laudable goals and some powerful features, and it's easy to configure and use. But it has some shortcomings that need to be addressed before I can recommend it without reservation.—GENE STEINBERG

Mathematica 2.2

Symbolic Mathematics Software

PROS: Sets the standard in symbolic computing; huge variety of training materials available; Function Browser solves earlier interface problems. **CONS:** None. **COMPANY:** Wolfram Research (217/398-0700). **LIST PRICE:** $595.

MW ★★★★

MATHEMATICA IS EASILY THE MOST esoteric product ever to achieve commercial success. From the outset, the program aimed not just to satisfy the needs of college math students or working engineers or other such plausible markets, but further, to offer every aspect of modern mathematics that can be implemented on a computer (for that matter, we may yet see an algebraic topology package cobbled together some day).

Version 2.2 adds a set of improvements to computational routines. It's faster at numerical solutions of sets of linear equations (an average factor of three times faster on my test sets), and symbolic solutions can be found in sets that Mathematica used to find objectionable. It uses complete integral methods as a type of solution of nonlinear first-order differential equations. In addition to nonlinear differential equations and first-order partial differential equations, another new extension to the calculus package is a set of functions for variational methods. The handful of cases in which Mathematica used to give incorrect answers for symbolic definite integrals have been fixed. There are new packages for elliptic integrals and curve fitting by splines, and random-number handling is more sophisticated. Version 2.2 generates 3-D contour plots and includes a useful package for audio-signal analysis and an entertaining package full of music options. MathLink, the utility that links Mathematica to the rest of the world and to the C language, has been updated to support a single Mathematica front end communicating with kernels on several different machines.

All these extensions and enhancements in 2.2 were to be expected, since Mathematica is by design easily extensible and permits addition of new packages in response to popular demand. The real news in the Macintosh version, particularly for new users, is the Function Browser. The Big Problem with Mathematica, from a Mac interface standpoint, has always been that you were required to

continues

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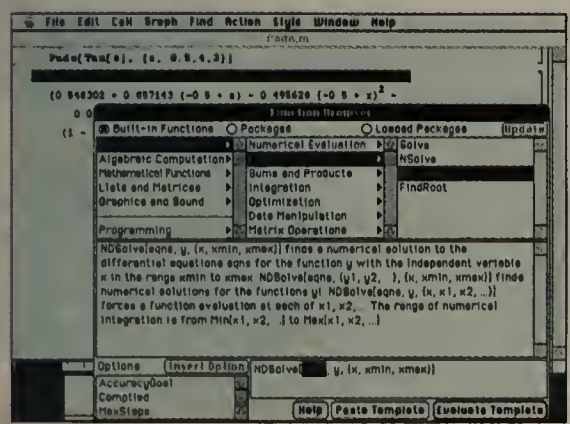
type in command expressions, often quite long ones, with correct syntax and punctuation and capitalization. If you inadvertently made a usage error in the command expression, the program's most typical response was simply to take no action when the command was entered. You could then at your leisure consult the thousand pages of the Wolfram Bible (*Mathematica*, second edition, Addison-Wesley, 1991) to determine where you had erred.

That less-than-agreeable situation has been fixed. The Function Browser has scrolling lists of all Mathematica operations, a generous chunk of help for each item, and a Paste button (see "Just Looking"). You can look up Plot3D, read the usage instructions, paste the command into your Notebook, and swap in your own parameters, in blissful assurance that you haven't missed any commas or brackets. As small as this feature might seem, in practice it changes everything. You can check out new package features in minutes, play with the program rather than work at it, and experiment with new techniques without a lapful of documentation. Mathematica is now, at last, a real Macintosh program.

Like its predecessors, Mathematica 2.2 still wants all the resources you've got. The "5MB recommended" in the product literature is an instance of the impish Wolfram sense of humor rather than a real hardware spec: running in 8MB is a bit of a pinch, and you will need 12MB if you want to have other programs open at the same time. In fairness, however, there's no way to provide such a huge range of facilities without taking up this much space, and memory is actually the cheapest resource in the computing environment. Version 2.2 is faster on many key computations, it includes the last few functions of general interest missing in earlier versions, and it finally makes Mathematica as easy to use as it should be. It's the one *essential* program in science and mathematics.—CHARLES SEITER



Just Looking The Function Browser includes both function descriptions and a paste option, so you can find the function you need and just paste it into your Notebook.

EMBARC

Portable Wireless Message Service

PROS: Full U.S. coverage; rapid message delivery; variety of news and info services. **CONS:** Primitive message management; no gateways for popular consumer information services; limited message size; monthly fees plus fee per message. **COMPANY:** Embarc Communication Services, a division of Motorola (407/364-2000). **LIST PRICE:** $395 plus $25 setup and fees per message.

MW ★★★

USING A PAGER-SIZE ELECTRONIC receiver, EMBARC (Electronic Mail Broadcast to a Roaming Computer), you can stay info-current in more than 200 U.S. and Canadian cities. This new wireless product pipes electronic mail, news, weather, and even sports directly into your PowerBook or other Macintosh.

To use the EMBARC hardware-software package, you must subscribe to Motorola's data paging system of the same name. The EMBARC paging system works by broadcasting messages—either news items or individual E-mail—from transmitters located in major metropolitan areas. The Motorola NewsStream receiver "hears" all messages broadcast in its area and saves those targeted for you in its 32K of memory for automatic transfer to your computer later.

The EMBARC package includes the NewsStream receiver, the EMBARC message-management application, and a start-up subscription to the EMBARC messaging service. The thorough (but unindexed) manual guides you through a simple installation procedure, letting you receive messages immediately. The starter subscription includes USA Today news briefs, updated three times daily. You can add other information services, such as stock-market quotes or custom electronic-news extraction, for an additional monthly charge. You also receive a GE BusinessTalk E-mail address. The EMBARC system automatically transmits messages directed to this address from other BusinessTalk users, or from other E-mail services through mail gateways. Currently supported gateways are MCI-Mail, SprintMail, IBM-INET, and AppleLink, with future X.400-compatible services to be added. Consumer-oriented online systems such as America Online, CompuServe, and GEnie aren't X.400-compatible, and aren't slated for gateway service in the foreseeable future, according to Embarc.

You carry the NewsStream receiver with you like a pager. Whenever the receiver captures news or E-mail, it beeps and blinks a messages-waiting light. When you next attach the receiver to your PowerBook or base computer, the EMBARC application automatically downloads the waiting messages—a process taking from one to five minutes.

The EMBARC application also doubles as a modem-based communications program. Because the NewsStream is a receiver, not a transmitter, you must log on to Embarc's central computer system—called the Switch—to send replies or forward messages. The application automatically dials the remote system and handles these chores. Because messages are consecutively numbered, the application can tell you when you've missed messages (because the receiver was turned off or was outside the coverage area). The Switch keeps a copy of all messages for several days, so you can retrieve missed items.

While the EMBARC application works well for basic message-reading chores, it has somewhat primitive facilities for message management and transmission. Once you've read a message, the only options available are deleting it, saving it to a file, or leaving it in your in box. To archive messages you must save each one to a separate TeachText file. Unfortunately, you can't view saved messages from within the application.You are also required to enter special commands in message subject lines when sending a priority message or directing a message to a specific geographical area (this method minimizes messaging costs; otherwise a message goes to all area codes). For example, to send a priority message to the 213 and 415 area codes, you must type {EM:NA=213,415,PRTY=P}. This is an error-prone process.

Message fees add up fast. There is an access fee for each message you send—from $0.35 to $1.00 per addressee depending on the length of the message—plus airtime charges from $0.18 to $2.52 per 100 characters, depending on the number of area codes and delivery priority. When you send to another EMBARC user, you pay all charges; you pay nothing to receive EMBARC-originated messages. You do pay all charges for gateway-originated E-mail.

The monthly fees and usage costs, plus the limited gateway access, make EMBARC a tough sell to the consumer market. However, if you're a PowerBook user who is frequently in places with no telephone, and you need timely delivery of electronic news and E-mail, you may find EMBARC useful.—MEL BECKMAN

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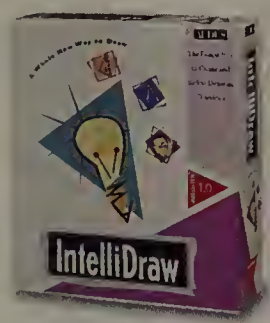

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VideoToolkit 2.0.1

Low-Cost Video Editor

PROS: Low cost; works with many types of consumer and professional equipment; supports QuickTime. **CONS:** Slow response time; interface needs streamlining. **COMPANY:** Abbate Video (508/376-3712). **LIST PRICE:** $279.

MW ★★★

IF YOU'RE A VIDEO ENTHUSIAST, IT'S easy to be enticed by digital editing systems like SuperMac Technology's DigitalFilm. Unfortunately, the high cost of desktop video puts it beyond the reach of many users. For those who need to catalog and edit videotapes on a budget, VideoToolkit is an attractive, inexpensive solution.

VideoToolkit controls up to two source VCRs and one record VCR using a special cable that comes with the package. One end of the cable connects to the Macintosh serial port; the other end sports three separate connectors—a miniature control-L plug suitable for most camcorders, a five-pin plug for some Sony VCRs, and a mini control-S plug that connects to some Sony recorders. (Cables for other decks are available from Abbate Video for an additional charge.) A small device that fits onto the cable's control-S plug also lets you record on consumer-type VCRs that use infrared remote controls. (My only gripe is that the cable could be a foot or two longer.)

When you launch VideoToolkit, you're presented with a setup window that lets you specify control parameters for the source and record VCRs. The VCR Type pop-up menu lists an astonishing array of recorders, ranging from low-end camcorders to frame-accurate decks like the NEC PC-VCR and Sony Vdeck. The setup screen also lets you choose the timing protocol that determines how VideoToolkit locates video sequences on tape: many high-end decks support time code that lets you pinpoint scenes down to the precise frame, while most consumer VCRs use a numeric tape counter, which is far less accurate.

The first step in the editing process is to identify key scenes on the source tape. You can watch the source footage on a separate TV monitor, or you can view it on the Macintosh screen if you have a video-digitizing board. As the tape rolls, you indicate in and out points for each clip by selecting Mark In or Mark Out from the Clip menu or by using keyboard commands. VideoToolkit prompts you to enter a name to identify each scene. You can instruct VideoToolkit to pause the source tape when you reach the clip's out point, so you can name the scene without missing any action.

VideoToolkit creates a separate index card for every clip, showing the clip's name, its in and out points, and its duration. Two text fields let you enter descriptions of the scene's video and audio tracks, and a check box lets you mark the clip as critical. If you're using a digitizer, VideoToolkit displays snapshots of the clip's in and out frames.

Next you prepare an edit list that specifies which clips to include in the final recording. (You can rearrange clips in the edit list by cutting and pasting, but dragging clip names would be more convenient.) When you're ready, VideoToolkit copies the scenes in the edit list to the record deck in the specified order, prompting you to insert source tapes as they're needed. During assembly, you can have the source tape pause at every in and out point, or just stop at clips that you've marked as critical. To improve accuracy for decks that don't support time code, you can have VideoToolkit rewind and rezero the source tape periodically.

In addition to transferring scenes from tape to tape, you can create QuickTime movies if you have a suitable digitizing board. For recording QuickTime sound tracks, VideoToolkit works with the internal audio digitizer on sound-capable Macs or with third-party digitizers. When you assemble an edit list in QuickTime, each scene becomes a separate movie file. You can fine-tune the clips using a QuickTime-editing application like Adobe Premiere, and then import the revised edit list back into VideoToolkit for final assembly on tape.

I put VideoToolkit through its paces on a Mac IIfx using a Sony CCD TR-5 camcorder as a source deck and a Zenith VCR as a record deck. I also tested QuickTime recording on a Quadra 800 equipped with a Radius VideoVision digitizing board. Of course, the quality of the final tape depends on the equipment you use, but I was impressed with the results I obtained with my low-end gear. I did encounter a few minor glitches: VideoToolkit occasionally lost control of my camcorder while logging tapes, forcing me to quit and relaunch. And because VideoToolkit is based on HyperCard, response seemed sluggish at times. VideoToolkit's interface also could be streamlined and its menus better organized. Despite those few rough edges, though, VideoToolkit is a very good choice for videotape editing and logging.

—FRANKLIN N. TESSLER

Virtual 3.0.1

Virtual Memory Utility

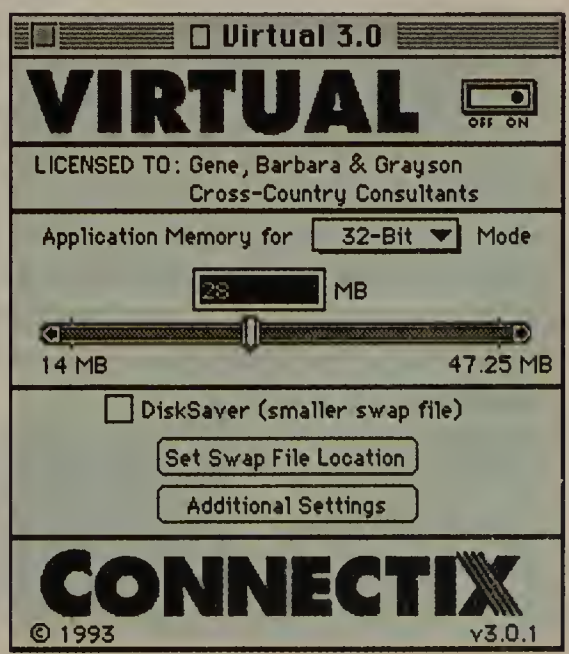
PROS: The only game in town for System 6 users; faster than System 7's virtual memory; DiskSaver feature reduces hard disk virtual memory partition. **CONS:** Works only with 68030 processors (despite manual's claims). **COMPANY:** Connectix Corporation (415/571-5100). **LIST PRICE:** $99.

MW ★★★

IN 1988, THREE YEARS BEFORE VIRTUAL memory made it into System 7, Connectix offered the feature to System 6 users. Virtual memory is a way of using hard disk space to swap data into RAM, to allow you to address more memory than is installed in your Mac's memory banks. The price is performance. RAM speed is measured in nanoseconds, and hard disk access speed is measured in milliseconds, so a slowdown is inevitable. But when virtual memory is used carefully, this slowdown is acceptable. With the advent of System 7, and Apple's virtual memory, one might have thought that Virtual would be useful only with System 6. But that's not necessarily so. The newest version of Virtual does provide a performance boost over Apple's version.

Virtual provides two alternative settings. DiskSaver sacrifices performance but allows you to limit the virtual-memory space on your hard disk to a selected amount. Virtual's normal setting and System 7's virtual memory require setting aside space on a hard disk for total application memory, RAM plus virtual. DiskSaver may be a boon to PowerBook users,

continues



The Basics The simple control panel allows you to select settings for Virtual, including the amount of memory allocated.

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where more RAM remains expensive and hard disk space is at a premium. Since virtual memory is disk intensive, Virtual is automatically switched off when you run the PowerBook on its battery, to extend battery life.

Virtual is easy to use. The handy control panel allows you to choose the amount of memory, whether DiskSaver should be active, and the location of the virtual swap file (the file created on your hard drive to hold data that cannot fit in RAM). Additional options allow you to select page size, to optimize performance for larger hard disks, whether to delete the swap file when Virtual is off, and whether to store the swap file in contiguous space. This last requires unfragmented space on your drive, but Connectix claims it reduces hard disk access time and thus speeds up performance.

Benchmarking Virtual is difficult. Performance depends on the speed of your hard disk, the size of the applications you use, the amount of virtual memory you select, and the kind of work you do, to name a few factors. For example, graphics and database software, as a result of heavy RAM and disk access, is apt to tax virtual memory.

As one test, I sorted a 6900-record file in FileMaker Pro on my PowerBook 180. I set total memory to twice that of the installed RAM. In its regular mode, Virtual ran at 96 percent of the rate of the PowerBook without virtual memory. The DiskSaver setting clocked in at 92 percent, and Apple's virtual memory brought up the rear at 88 percent.

In day-to-day work, it was hard to perceive much of a difference in performance. If you do word processing or simple desktop publishing work, you'll probably see little if any performance deterioration.

Quirks were few and far between. Virtual gave little warning when my hard disk didn't have enough contiguous space to build a swap file. I had to open the control panel to get a message box indicating that Virtual couldn't load.

Tech support is a toll-free phone call. The manual is brief, but provides some very helpful advice on maximizing performance when virtual memory is active.

If you use virtual memory only occasionally, the performance boost provided by Virtual over Apple's virtual memory may not be terribly important. For the price of Virtual, you could buy another 2MB or more of RAM for most desktop Macs. But if you need to eke out as much virtual memory speed as possible, Virtual remains a useful tool. If you're still using System 6, it's the only choice you have.—GENE STEINBERG

FontMonger 1.5.7

Font-Conversion Utility

PROS: Provides cross-platform, cross-format font conversion; makes it easy to create composite, subscript, superscript, and rotated characters; permits editing character outlines with simple drawing tools; imports graphics files as new font characters. **CONS:** Has some font-naming problems in cross-platform conversions; automatic hinting and kerning is less refined than in hand-tooled fonts. **COMPANY:** Ares Software Corporation (415/578-9090). **LIST PRICE:** Version 1.5.9 $149.95.

MW ★★★★

WHEN FONTMONGER ARRIVED nearly three years ago, its claim to fame was that it could convert the new TrueType fonts into PostScript Type 1 or Type 3 format, and vice versa. Version 1.5 builds neatly on this trick, incorporating not only additional formats and cross-platform compatibility, but also enhanced character modification and editing tools. People who want to create a font from scratch should look to the higher-end Fontographer from Altsys Corporation or FontStudio from Letraset, but FontMonger 1.5 will suit the needs of many a harried desktop publisher.

Working on the same document on a Mac at the office and on a DOS PC at home can be frustrating if you don't have the same fonts installed on each system. FontMonger 1.5 lets you convert TrueType or PostScript Type 1 or Type 3 fonts to either platform. It can read to and from the Nimbus Q and Next PostScript Type 1 formats, and it can read LaserMaster LXO, CorelDraw WFN, and Agfa Intellifont formats. The fonts convert nicely enough, but sometimes the resulting font names, particularly as they apply to weights (light, medium, and bold, for instance), are inconsistent between platforms. The new Convert Batch feature is handy for converting several fonts at once, and FontMonger's ability to scan your hard disk or designated folders for fonts is definitely a time-saver.

Altered States Customizing the outline of a character is as easy as choosing it from the keyboard window (in the background) and clicking on the pen tool in the window where you alter characters.

Converting fonts is a fairly pedestrian, if necessary, task in these mixed-platform days. The real fun with FontMonger begins when you open a font. In the initial release, you could create a new version of a font composed entirely of small caps, slanted, subscript, or superscript characters. Version 1.5 adds rotation and scaling and makes it easier than ever to combine characters to create custom composites such as fractions and ligatures. (These composites may already reside in your font; they are often digitized—along with many other leftover characters and symbols—and included in the font as unencoded characters. FontMonger 1.5 lets you ferret these out and assign sites to them on your keyboard.)

In addition, you can easily rearrange the characters on your keyboard to suit your wildest whim. If you regularly include dingbats or other symbols in your documents, FontMonger's facility for cutting and pasting characters from other fonts into your new one can be a real boon. You can even import a logo designed in a draw program such as Adobe Illustrator, Aldus FreeHand, or Deneba's Canvas into your new font. The drawing tools included in FontMonger 1.5 aren't up to designing the corporate logo, but they are quite adequate for simple editing of individual outlines.

To modify an entire font or a selected range of characters, you generally work in a window that simulates the computer's keyboard; the convenient new Character Chart window, however, displays all the *glyphs* (type-talk for characters and symbols), even the unencoded ones, in a gridlike layout. There's also a new Alter Character window that lets you edit individual glyphs or create composites. Built-in slant, rotate, scale, and width tools can be accessed either by pulling on handles that surround the glyph or by typing numbers (percent of "normal") into the appropriate boxes. Clicking on the pen tool reveals the glyph's outlines, replete with Béziers.

For many publishing tasks, FontMonger is a godsend. You should take care to adhere to the licensing agreements attached to your original fonts, and devoted font aficionados may quibble with the automated hinting and kerning schemes—hand-tuning a font will always yield the more-perfect form—but in this newest guise, FontMonger is a tool that just about anyone this side of a full-bore font designer is sure to find useful.
—SUZANNE STEFANAC

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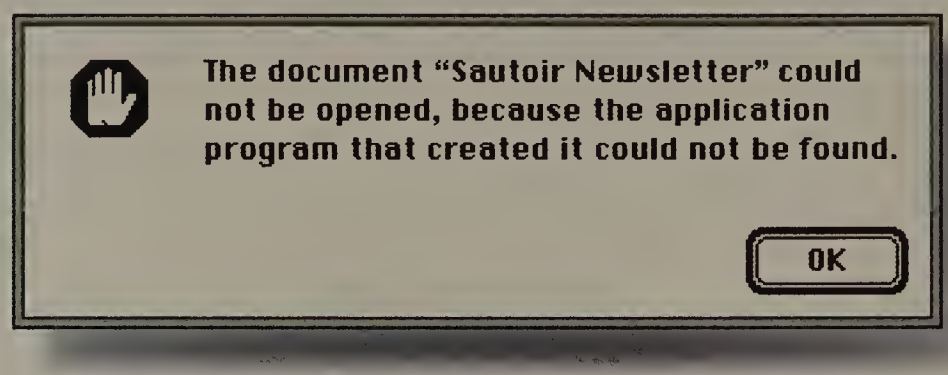

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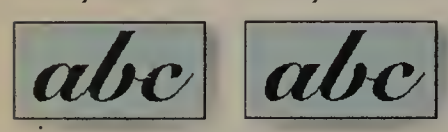

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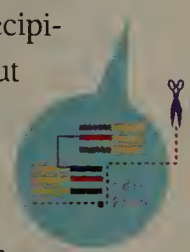

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MarcoPolo 2.0

Document Imaging and Management

PROS: Can search by title, contents, keywords, or comments; built-in scanner interface; user access control; can use predefined keywords; easy-to-use query panel. **CONS:** Cannot create groups for access control; no OCR capabilities.
COMPANY: Mainstay (805/484-9400).
LIST PRICE: $395.

MW ★★★★

IF IT'S TIME FOR YOU OR YOUR WORKgroup to organize those files and papers flying across your desk, then take a good look at MarcoPolo from Mainstay. MarcoPolo 2.0 provides easy document imaging and management for individual and group users alike.

MarcoPolo is organized around the concept of the document center, which stores searchable images of documents either on your Mac (an individual document center) or on a file server (a group document center). Aside from the network connection, you use both individual and group document centers in the same way.

Mainstay has increased the number of methods you can use to archive a document, making the process much easier than in previous versions. First, you can use the MarcoPolo application to import documents into a document center. You can also create a temporary archive on your hard drive by "printing" to the document center. Select the document center in the Chooser, then choose print from within the file you want to archive. The temporary file is then archived into the document center the next time you open MarcoPolo. The newer, easier methods of archiving include the ability to (1) drag a file to a MarcoPolo drop folder on your desktop, and (2) use a Mainstay INIT to add an Archive function to the application's File menu. I found the Archive menu option to be very convenient.

You can add any type of document to a MarcoPolo document center. If you print to a document center or use the Archive option, MarcoPolo indexes all text within the document. MarcoPolo can import Glue, PICT, text-only, EPS, MacPaint, and MarkUp file formats. MarcoPolo can now also archive sound files and QuickTime movies.

When you archive a document using MarcoPolo, you can assign up to six keywords for document classification and specify which of the document center's users have access to the document. Unfortunately, MarcoPolo does not allow you to designate a group. To make document classification easier in workgroups, MarcoPolo allows the document center administrator to define the keywords users can use when classifying archived documents. This way, everyone uses the same word for a classification and knows what to look for next time—for example, have everyone use *car* instead of *auto* as a keyword, since searching for one won't find the other.

MarcoPolo is a true archiving solution. It permits you to store multiple copies of a document with the same name. Identically named files are distinguished by the time and date of archiving, making it convenient to use MarcoPolo for managing edited documents. For example, when you include an original document (such as a Microsoft Word file) with its archived image, other users on the network can retrieve the original document, make changes, and archive the resulting new version without replacing the original document.

Once you've archived documents, any authorized user can search for documents. You can search by either the document's name or its contents, date the document was archived, original creator of the document, and keywords. Version 2.0 now lets you search multiple document centers at the same time. Selecting search criteria is as easy as selecting from a list of predefined words and either entering text or selecting a term, keyword, or date from a list of options. To help you verify the query, MarcoPolo then constructs a sentence using the terms you used in your search query.

To track documents that are not already in an electronic format, MarcoPolo 2.0 includes a built-in interface to Apple- and TWAIN-compatible scanners. MarcoPolo allows you to scan in documents and store images of those documents in a document center for later retrieval. Unfortunately, however, MarcoPolo doesn't include any OCR capabilities, so unless you use a separate OCR program to recognize the text, you'll only be able to search by the document's name and any assigned keywords.

MarcoPolo is an easy-to-use, inexpensive product for archiving and retrieving documents, whether you initially received them in electronic or paper form. I routinely use it to locate documents in an individual document center as well as in a workgroup document center. Queries are easy to construct, and searches are handled quickly.

—DAVE KOSIUR

Chameleon 2.0.3

Desktop Pattern Utility

PROS: Slick interface; collection of gorgeous patterns included; can save custom patterns to disk as separate documents. **CONS:** No zoom feature in editor; limited drawing tools.
COMPANY: Logical Solutions (612/659-2495)
LIST PRICE: $59.95.

MW ★★★

CHAMELEON IS A SLEEK AND SIMP desktop-pattern editor that lets y create and display patterns that far su pass the standard 8-color, 64-pixel jo included with Apple's system software

With Chameleon, you can transfo your desktop into a blanket of blue pla or a sea of aquamarine marble. And if t program's dozens of exquisite, large-sc textured patterns don't impress you, y can use Chameleon's limited but fun tional editing tools to create your ov patterns or doctor somebody else's.

Unlike Thought I Could's Wa paper, another similarly priced deskto pattern editor, Chameleon is not a co trol panel; it's a stand-alone applicatio The program's main interface, the pa tern window, is equipped with seven bu tons you use to cycle through the acti set of patterns stored in the program. T active set can contain as many as 256 pa terns. You can add patterns to the set importing them (documents containi sets of stunning patterns are include and you can export designs. To strea line pattern selection, there are nume ous keyboard shortcuts available in t pattern window, and all are clearly do umented in the manual.

With Chameleon's preview featu you can apply a pattern to your deskt temporarily by double-clicking on t pattern displayed in the pattern windo To permanently apply the new pattern that it will remain the next time y restart your Mac, you just click on t Install button (or press ⌘-S).

The patterns supplied are truly ou standing. The rich, textured color imag include a whole collection of gorgeo marbelized patterns licensed from A beats, a company that specializes backgrounds and textures for deskt publishing and multimedia. Especia impressive are those in which the 128-b 128-pixel repeating patterns blend sea lessly into one another to create wh appears to be a solid texture across t whole screen. (The program disk al

continues

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ıdes a collection of smaller-size pat- ; and black-and-white patterns.)
Chameleon provides an uncompli- l environment for creating screen ;rns from scratch. The pattern edi- lisplays an enlarged Fat Bits–type of your work, and you can adjust the of the editor window to accommo- the dimensions of the pattern you : to create—from 8 by 8 pixels to 128 28. The window also adjusts to cre- ectangular patterns, with dimensions ıy, 64 by 128. The Modify menu con- ; commands for the rotation, hori- al and vertical flipping, and color rsion of pattern elements.
The available painting tools are sur- ngly weak. There's no paintbrush, no ı tool, and no zoom feature. Also, you : change line width or pencil size, and can't constrain the pencil or the line to draw perfect horizontals or verti- The 256-color palette is oddly ;ned, too, with very tiny color tiles. To preview your work, you click on ye icon at the lower left of the editor low. This temporarily hides the win- and applies the pattern-in-progress ıe Mac desktop so you can see how it look in actual use.
Chameleon's documentation pro- s clear instructions for using all the ;ram's features and includes some ible guidelines for designing patterns won't make you dizzy after a few -s on the desktop ("If you find large s of yellow, red, blue and green all in ;ame pattern, it's time to start over," manual politely admonishes.)
Of course, there are cheaper alterna- ; to products such as Chameleon. If d like to decorate your desktop with ;, dramatic patterns, but don't intend reate your own, shareware such as ktop Textures (which includes some ıtiful textured patterns and can be nloaded from online services) will do trick—and do it well. But if author- your own desktop patterns seems ortant enough to justify paying 95, Chameleon is a fine tool for the —JOSEPH SCHORR

ırn Painting Chameleon's editing window ɔu modify or create patterns using simple paint- ols. Note the eye icon; clicking on the eye tem- ly applies your pattern to the Mac's desktop u can preview your efforts.

CPU 2.0

PowerBook Utility

PROS: Novice and expert interfaces; file synchronization; extensive power management; comprehensive keyboard shortcuts. **CONS:** Synchronization confusing; documentation insufficient; security features easily bypassed. **COMPANY:** Connectix Corporation (415/571-5100). **LIST PRICE:** $99.

MW ★★★★

CONNECTIX POWERBOOK UTILITIES (CPU) was the first collection of utilities designed specifically for PowerBook users. Now there's competition from the likes of Claris and Symantec, so Connectix has introduced CPU 2.0.

Most of CPU's features are accessed through a single control panel. With version 1.0, you configure each feature individually by clicking on an icon in a scroll box and then changing the settings that appear. You can still do this using the Fine-Tune mode in version 2.0, but the QuickConfigure mode allows you to toggle options for all features via one set of check boxes. And all of the power-management features can be adjusted at once, using a single slider bar to trade battery life for faster computing. CPU 2.0 also has an expanded menu at the right side of the menu bar for going directly to the Fine-Tune mode of any feature. You need not open the control panel to enter Sleep mode, adjust backlighting, change SCSI disk mode ID (on PowerBooks except the 140, 145, and 170), switch modem ports, or toggle AppleTalk without restarting.

The separate EasySync extension checks for duplicates whenever you drag files from one location to another. If a file in the destination has the same name as a source file, you can merge, sync, replace, or cancel. Replace and Cancel are the only options the Finder would offer under these conditions; simply replace the existing file at the destination. Merging means copying newer versions from the source. Sync is a two-way merge: newer versions in the destination are also copied back to the source. In neither case does EasySync bother copying unmodified files that exist in both locations. This is similar to the Smart Replace feature of Fifth Generation Systems' CopyDoubler, but without the improved copying performance.

To automate a drag-and-drop procedure, you can record EasySync scripts called Synclets. Creating and using Synclets can be difficult to comprehend; however, with considerable experimentation you can use this feature to automatically synchronize files at start-up and create backups. EasySync synchronizes files, not content. Synchronizing the modified records of two databases, for example, requires a database manager that features content synchronization, such as Portfolio Software's Dynodex 3.0.

Managing power has always been CPU's strongest suit. CPU lets you specify the period of inactivity that invokes battery-life saving measures. CPU also allows different settings depending on whether the PowerBook is running on battery or AC power. For models with variable-speed processors (all PowerBooks except the 100 and 140), CPU slows down a Mac running on battery power, and speeds up a Mac that's plugged in.

Keyboard Power lets you access just about any menu or dialog box option with keystrokes. And user-configurable hot keys provide instantaneous control over spin-down, sleep, and backlight settings. By using the control key in combination with the arrow keys and numbers, version 2.0 mimics the page up, page down, home, end, forward delete, and 15 function keys found on the Apple Extended Keyboard. To help you keep track of most of these keyboard options, Connectix has added a Hot Keys Summary screen.

CPU has always maintained preference sets that determine how the PowerBook behaves depending on the user or the location. New in version 2.0 is the Punch Through command, which simultaneously configures specific features the same way in all sets belonging to a particular user. And CPU now remembers what printer and desktop patterns were last used with each set. Other minor improvements to CPU 2.0 include the ability to dim external monitors as well as the PowerBook's own display. AppManager switches between active applications using hot keys, but I prefer using System 7's Application menu.

Finally, CPU 2.0 has new menu-bar indicators that show when the PowerBook is reading from and writing to SCSI devices and floppies. I'm still waiting for an indicator that shows whether the hard drive is spinning.

With version 2.0, Connectix addresses most of the shortcomings of the first release, except that CPU's security features can still be bypassed by inserting a bootable System disk and restarting. Nonetheless, the new stuff easily justifies the upgrade price of $19.95. And PowerBook owners looking for their first utilities package should definitely consider CPU 2.0. I consider this extensive collection of features indispensable and reasonably priced.—OWEN W. LINZMAYER

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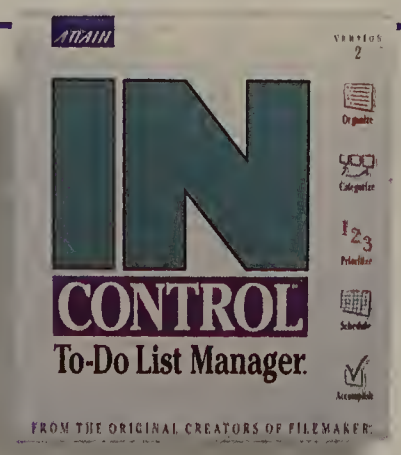

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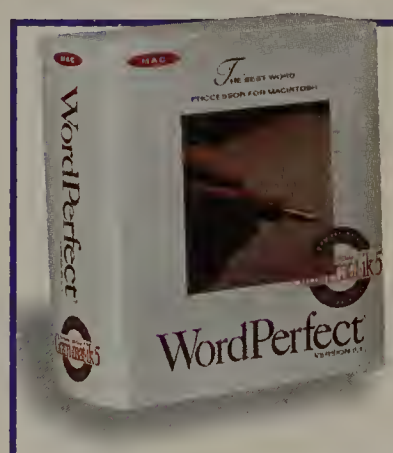

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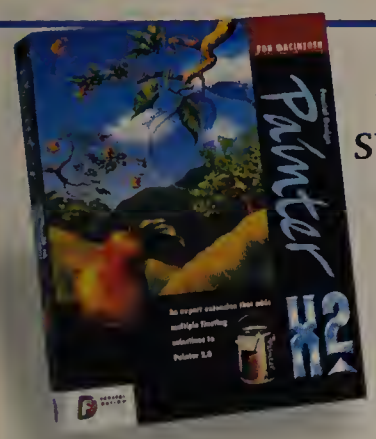

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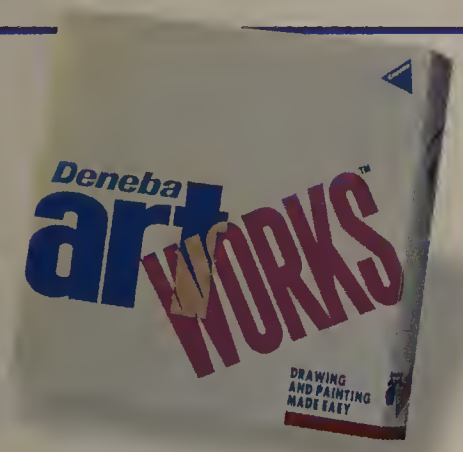

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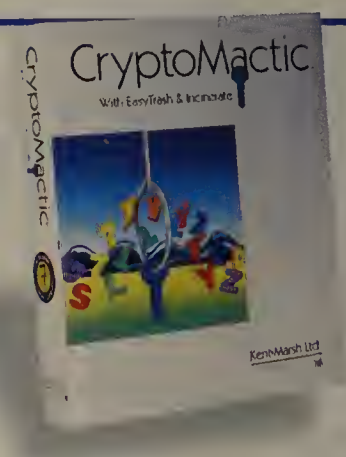

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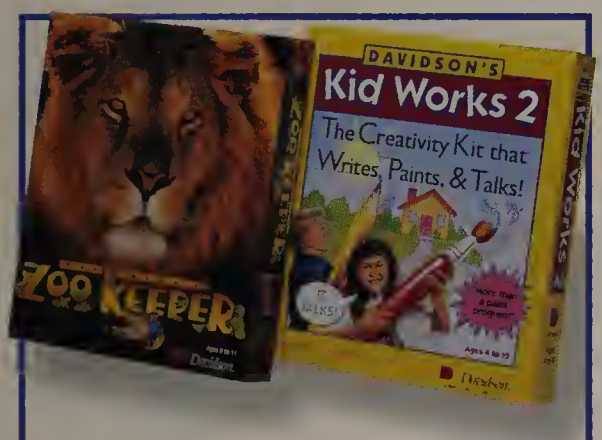

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11538 Spectre Supreme 40. 11537 LAN 2-Pak 52.
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1758 Monopoly..... 19. 1746 Risk..... 29.
1743 Scrabble Deluxe ..... 19.

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10639 Action! Mac Competitive Upgrade ..... 99.
7651 Action Mac 149. 5087 Director 3.1 .... 799.
12320 Director Ver. Up. from 3.0 175. 12321 2.0 369.
10630 Director Comp. Upgrd. from SuperCard 589.
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12577 Pro Audio Spectrum LC..... 299.

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10362 Passport Producer 95. 8250 Encore 379.
Radius
1738 PrecisionColor Pivot *(reqs. interface)*.. 999.
7870 Rocket 33 ..... 1599.
1749 VideoVision Studio ..... 1799.
RasterOps
8944 RasterOps 24STV ..... 799.
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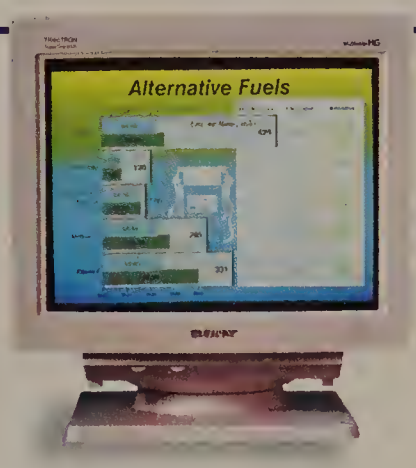
★ **Sony ... 60 day MBG**
10530 CPD-1430 14" Multiscan Trinitron Monitor 689.
10529 CPD-1730 17" Multiscan Trinitron..... 1149.



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9059 Arthur's Teacher Trouble..... 41.
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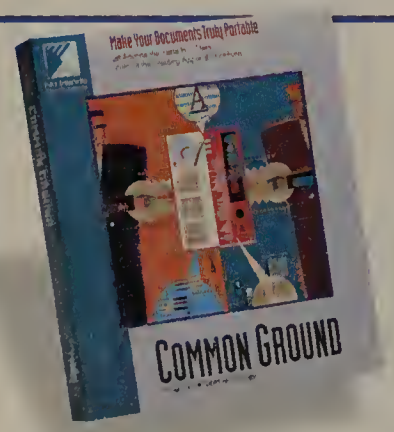
2321 CD-ROM Caddy.. 11. 2533 *(5 pack)*. 49.
4084 America Alive! 75. 8057 Porta Drive 619.
Creative Multimedia Corp.
11001 The Complete Works 19. 11004 Audubon 45.
11003 Family Doctor HyperCard Version..... 45.



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7312 Education Series Vol. 1 ..... 105.
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11457 Aesopolis..... 49.
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11186 Velveteen Rabbit..... 29.
11183 Greatest Children's Stories ..... 29.
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10308 US Atlas 34. 3915 Grolier Encyclopedia 225.
Warner New Media
11008 Desert Storm 27. 11007 Word Tales 39.
11028 Magic Flute 44. 11026 The Orchestra 54.
Wayzata Technology
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11605 CD Fun House 25. 10188 Macnificent 7 35.

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7101 AppleTalk Remote Access ..... 149.
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11052 M144I V.32bis FaxModem ..... 239.
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11698 MVP144MAC..... 239.
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11419 ACCURA 144 + Fax 144 ..... 235.
11422 ACCURA 96 Fax ..... 209.
2300 Smartcom II Mac.. 84. 3226 Upgrade 44.
5971 OPTIMA 24 119. 5970 OPTIMA 96 359.
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7557 Access PC.. 59. 3441 SoftNode 2.0.. 89.
4089 Univ. SoftPC. 99. 10553 SoftPC Win .. 299.
11631 SoftPC Pro 3.0/RapidTrak Bundle..... 195.
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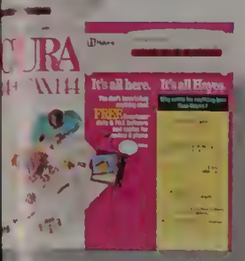

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2311 V.32 Modem.. 199. 4698 V.32bis .. 215.
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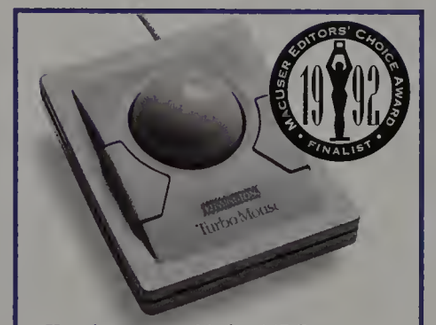

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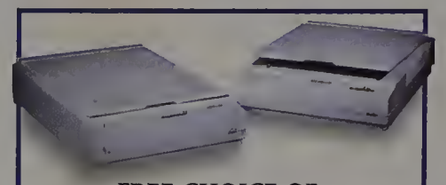
12012 hammerTape525..... 1029.



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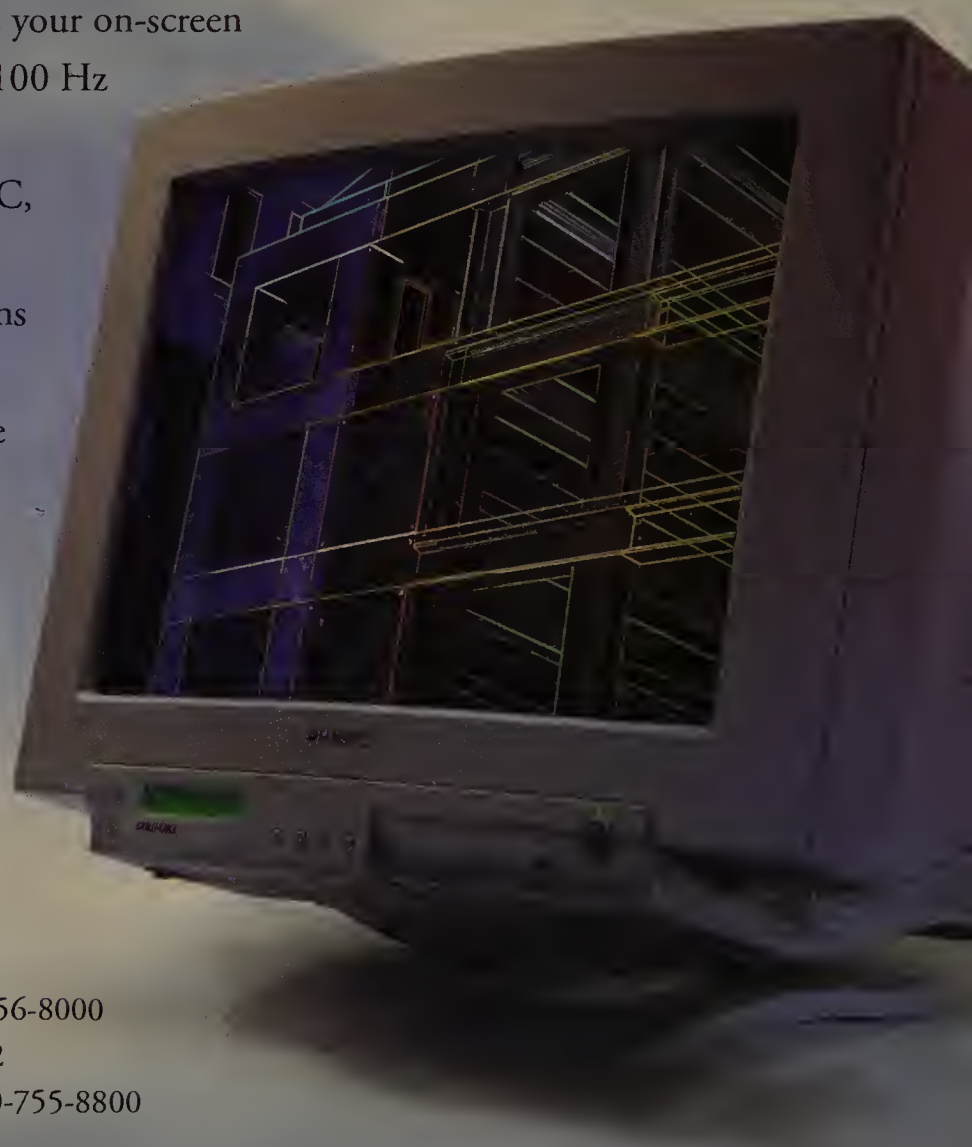

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SmartStack

Storage Peripherals

PROS: Simple, neat cabling; easy to configure. **CONS:** Expensive. **COMPANY:** Envisio (612/628-6288). **LIST PRICE:** SmartSource $199; SmartModule HD125 (Quantum) $549; SmartModule HD1225 (Quantum) $2899; SmartModule MO128MB $1799; SmartModule DAT $2199; SmartModule 105MB Removable $999.

MW ★★★

THE BIGGEST QUESTION TO ASK about a product is Do I need it? With SmartStack storage peripherals, the answer is probably no. The SmartStack modules address a problem many of us deal with daily—cable clutter—but only true neat-freaks will need or want this expensive solution. The SmartStack line of modules—each housing a 3½-inch drive—includes a digital audiotape (DAT) drive, a SyQuest 105MB removable drive, a 128MB magneto-optical drive, and a slew of Quantum and Conner hard drives ranging in capacity from 120MB to 1370MB.

The SmartStack allows you to stack these modules on top of a common power supply. A flexible design lets you add new modules to the top of the stack with a minimum of effort. Only the back of the power supply—the base unit Envisio calls the SmartSource—has cabling attached.

The base unit houses a single 120W power supply that feeds up to seven modules. Both power and data are conducted through a bus that runs vertically through all of the devices on the stack. The connectors—which look like SCSI connectors but are actually a proprietary design—sit on the top and bottom of each unit. The base and a lid on the top of the stack are the bread in this high-tech sandwich. A connector on the lid passes back the power and SCSI signals so that the entire stack is grounded and terminated. Slick. And it works.

The primary benefit of the SmartStack is fewer cables. You attach only one power cable and one SCSI cable to the stack regardless of how many devices you have—the rules of SCSI and the laws of physics notwithstanding. This means that if you're using a Centris 650 with an internal hard drive, you can have six additional hard drives on your SmartStack. Of course you're not limited to hard drives.

If you already have a significant investment in drives, Envisio provides a kit to convert any 3½-inch drive into a SmartStack module. The SmartKit costs $99.

Prices for modules are high compared with like mechanisms. Although value varies by module, you could easily expect to pay 50 percent more than the going external prices (that's with a power supply). First-time buyers must spend an additional $200 for a base unit. Is the extra $200 to $400 worth it? I like the SmartStack's simplicity and expandability, but with the extra cash I could buy over 150MB more storage space. And since there's only a one-year warranty (when many products now offer three- to five-year warranties), I recommend you wait until the prices come down.

Still, the SmartStack does provide an option for the certifiably neat.—TIM WARNER

RICHARD RETHEMEYER

SmartStack modules from Envisio

SoftPolish 1.1

Program-Quality–Assurance Utility

PROS: Works with all Mac programming languages; fast checking of all important interface details. **CONS:** User can't adjust some specific details. **COMPANY:** Language Systems Corporation (703/478-0181). **LIST PRICE:** $295.

MW ★★★

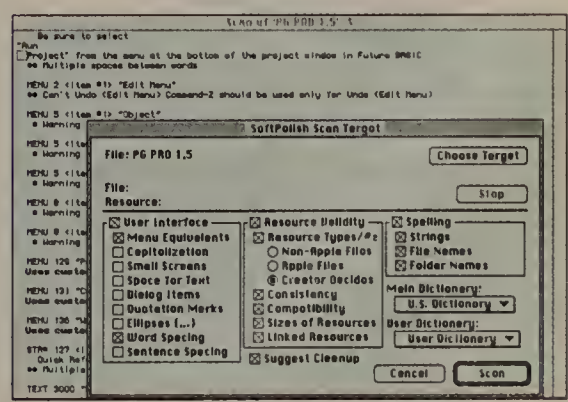
SOFTPOLISH IS A PROGRAMMING TOOL that belongs in the software library of any company that hopes to produce successful commercial Macintosh applications.

SoftPolish automatically identifies the resources in a program's interface, and then systematically checks all of them against a huge laundry list of possible errors. Most of the errors are the kind of tiny nagging details that would drive a programmer crazy to track down, while others are really damaging. As an example of small aesthetic points, SoftPolish checks for proper use of quotation marks, capitalization in menus, and ellipses. To prevent a program's designers from appearing hopelessly gauche to software users, it also checks spelling, word spacing, and layout of control items. Finally, SoftPolish makes sure the final product will fit without problems on the millions of Macs with 9-inch screens. It performs these services with amazing speed (it can zip through a problem-sparse 300K application in a few minutes) and logs the results to a suggestions file for reference.

Language Systems, best known for the leading Mac version of FORTRAN, recommends using this program early in the programming process and often. If SoftPolish is invoked at the beginning of a development cycle, ongoing quality control can enforce interface consistency; if it's called in at the end, programmers might find themselves scrolling through 50 pages of details that have to be fixed before an application ships.

It's particularly instructive to run SoftPolish on shipping commercial applications. It will flag, for example, a dialog box where it feels the text is too crowded—when you run the application and find the box, you find out SoftPolish has remarkably fine discrimination. In a nasty mood I could complain about ten well-known applications that produce yards of correction-file printout from a SoftPolish check. In a more benevolent state of mind, I would say that any company producing a Mac version of a program first coded for Windows *desperately* needs this product. If this warning isn't enough, there are several other developers' incentives in the SoftPolish package. It automatically removes testing and debugging resources (you provide the list), it sets all files and folders to the date you specify for final cleanup, and it provides logs not just of errors but also of corrections. You can even have SoftPolish provide you with a list of strings in resources as a starting point for documentation, or to produce a foreign-language version of your application.

It would help if there were some form of user customization of SoftPolish's internal guidelines about correct screen layout, but this is a small complaint. SoftPolish is well worth its price to serious programmers, and I can only hope that Language Systems keeps extending it.—CHARLES SEITER



Making a List, Checking It Twice SoftPolish will inspect the resources associated with any Mac program, and flag spelling errors, interface problems, and screen aesthetic infelicities. Note the encyclopedic set of test conditions.

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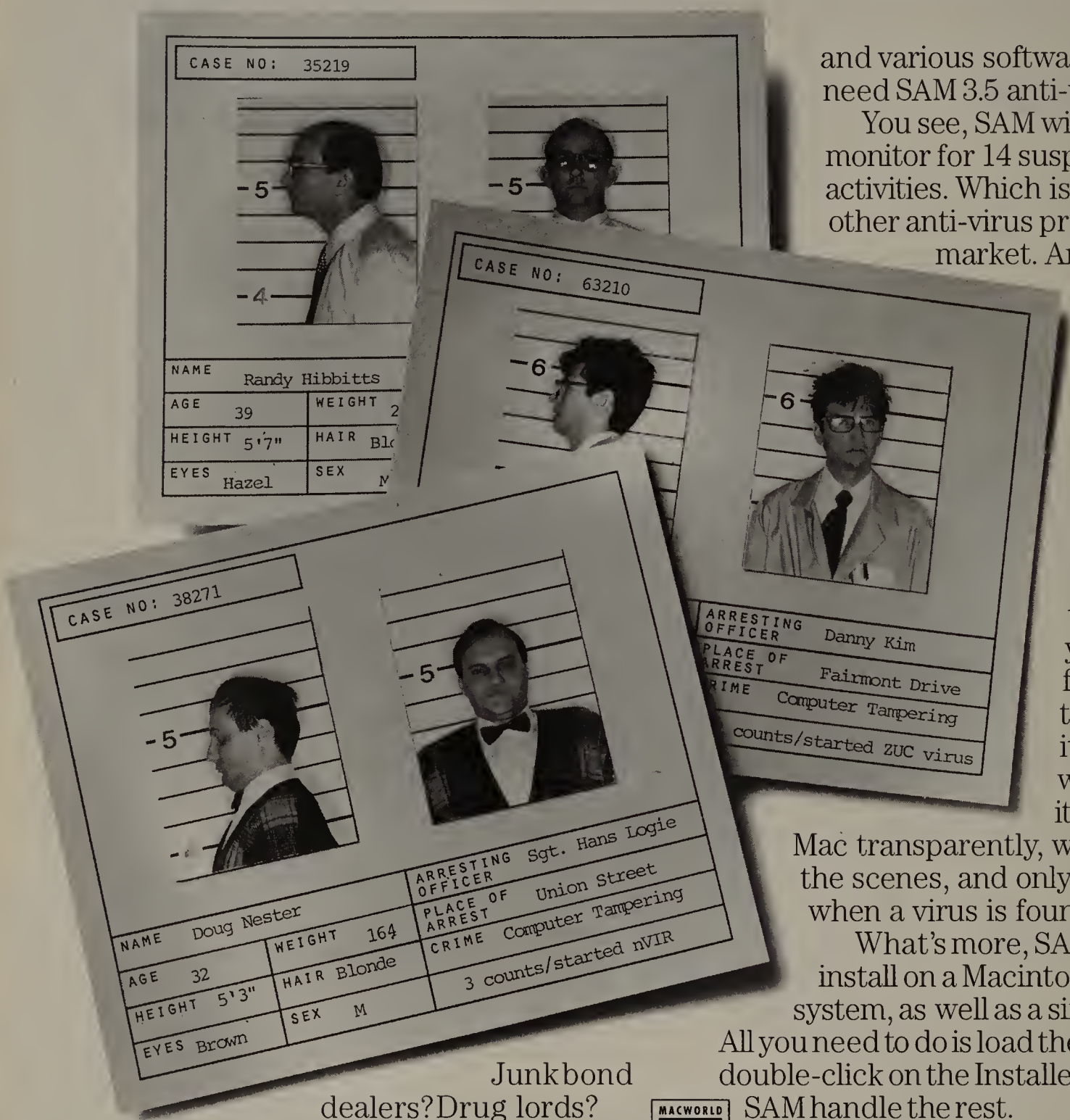

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SourceSafe 2.1

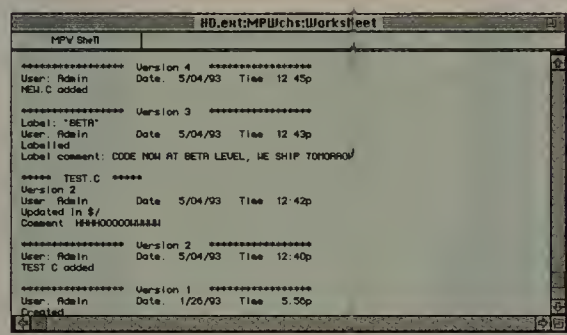
Programming Software

PROS: Multiplatform control; well-designed command set; superior technical support. **CONS:** Command-line interface only. **COMPANY:** One Tree Software (919/821-2300). **LIST PRICE:** $295; five-pack $1195.

MW ★★★

VERSION CONTROL TOOK ON NEW importance when the C language came to dominate software development, bringing along programs composed of hundreds of small mutable elements. If you're working on a modest program, you will probably find that the project-management facilities built into a modern compiler package (Think C is a good example) are sufficient for keeping track of your code. If you're working in a small group of Mac programmers, it's likely that Projector, which is built into the Macintosh Programmer's Workshop (MPW), is taking care of your needs, even if you have to resort to a few workarounds.

On the other hand, if you're working with a group of programmers developing a program for both the Mac and DOS and Windows PCs, those Mac-only tools can't handle the program-development administrative tasks. SourceSafe can (a multiplatform version is available). It also does Windows NT; OS/2 and Unix versions are currently being tested. In SourceSafe, an administrator puts all the files associated with a program in a central database, which can reside on a hard drive anywhere on a network (SourceSafe includes special provisions for Novell NetWare). Authorized users can check out files for modification—SourceSafe checks the file out to one user at a time, maintains a locked original version while the file is being edited, tracks version-to-version file differences in a difference trail, and tags each version with comments. SourceSafe maintains separate project histories (besides file histories) to account for file additions and deletions and renamings in a project. Besides full access for file editing, SourceSafe allows no-access, read-only, and administrative (manage users and passwords) levels.



Everything's under Control SourceSafe maintains version histories of every piece of code in your programming projects, including user histories.

SourceSafe keeps the most recent version of each file and a difference trail to reconstruct earlier versions. This scheme is efficient on cross-platform projects with lots of shared code; files shared across different computer systems exist in only one current version, in the server code database, at any given time. SourceSafe also recognizes end-of-line character differences between Macs and PCs, and lets you define what will happen when you GET a file (you can see resource plus data forks on the Mac, and just the data fork on the DOS side).

The Macintosh edition of SourceSafe works within the MPW shell, essentially adding about 40 special version-control commands to the MPW command set. The interface is a whiff of the past, with classic command-line switches reminiscent of character-terminal DOS or Unix. One Tree's technical support, however, has plenty of tips for efficient use of the product, and after a day or so the eight or nine most-used commands become second nature. Given that there really isn't any substitute for SourceSafe in Mac cross-platform development, it's encouraging that One Tree offers such a solid, relatively easy-to-use product. —CHARLES SEITER

EasyFlow 1.1

Flowcharting Software

PROS: Flowchart can appear in different magnifications in split-screen view; user can control routing of intersecting lines; variety of line endings; base chart and subcharts are stored in one file. **CONS:** Can only display built-in fonts; symbols limited to three sizes; no customizable symbols; no on-screen rulers for viewing scale; scrolling in split-screen mode not always linked. **COMPANY:** HavenTree Software (613/544-6035). **LIST PRICE:** $229.

MW ★★

THE SEARCH FOR THE IDEAL FLOWcharting program continues. EasyFlow, a program popular in the DOS marketplace, has been ported over to the Macintosh and provides some features not found in competing Mac programs. Unfortunately, the program's rough edges and distinctly un-Mac-like attributes reflect its DOS heritage.

EasyFlow has three symbols palettes—Dataflow, Organizational, and Standard (that is, program analysis)—which should be adequate for the average user. Unfortunately, EasyFlow doesn't have an option for creating or importing other symbols, and you're limited to three predefined sizes for each symbol.

On the plus side, EasyFlow has the widest variety of line endings of any flowcharting program I've seen. Line endings include the arrowhead, the crow's-foot (similar to an arrowhead), an intersected circle, and a bar. Any two of these line endings can be paired (and the pair remains highlighted in the palette) for use at either end of a connector in the flowchart. The palette displaying these options is a bit confusing at first, but I got the hang of it after a few uses.

All Macintosh draw programs allow you to adjust the default spacing between objects by setting up a grid. EasyFlow's interface for setting grids is one of the most intuitive I've seen. When you select Show Grid from the Options menu, EasyFlow automatically draws horizontal and vertical lines in your flowchart. To align objects relative to the edge of the page or to space objects, you simply drag the grid lines to the positions you want. Unfortunately, because EasyFlow lacks on-screen rulers, you won't be able to accurately gauge the distance between grid lines.

As your drawings get larger, EasyFlow provides two useful options for navigating the flowchart. First, option-clicking centers the drawing on the cursor's position. Second, you can divide the screen horizontally or vertically, or both. Each pane in the split-screen mode presents four magnification settings, so you could see a bird's-eye view (for navigation, for example) next to a regular-size drawing (for viewing detail). Although the views are supposed to be linked, I noticed that when I scrolled one view outside the area of interest, the other view did not realign.

EasyFlow restricts you to the use of five built-in fonts (EasyBase, EasyBold, EasySubscript, EasySuperscript, and EasyGreek) while drawing a flowchart. When you print, however, you can select one of the fonts in your System file.

EasyFlow allows you to create links between a base chart and subcharts (subcharts are secondary charts that can be linked together, sort of like subtopics in an outline). In this way you can produce a base chart and link highlighted symbols on it to subcharts that contain more details about the process or organization you're charting. EasyFlow also stores the base chart and its associated subcharts in a single document.

On the whole, EasyFlow is easy to use; but until the program offers better support for Mac fonts and the ability to size flowchart symbols, I would not recommend EasyFlow to any serious flowcharter. —DAVE KOSIUR

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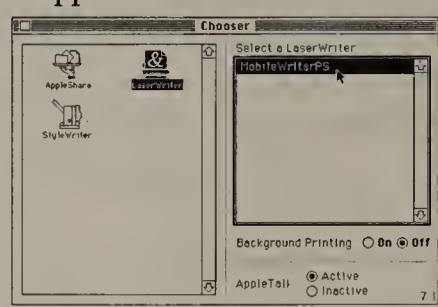

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f(z) 6

Math Software for Complex Variables

PROS: Complete set of textbook examples; intelligent use of color and animation to portray four-dimensional plots. **CONS:** Needs integer color-graphics option for speed. **COMPANY:** Lascaux Graphics (602/299-0661). **LIST PRICE:** $115.

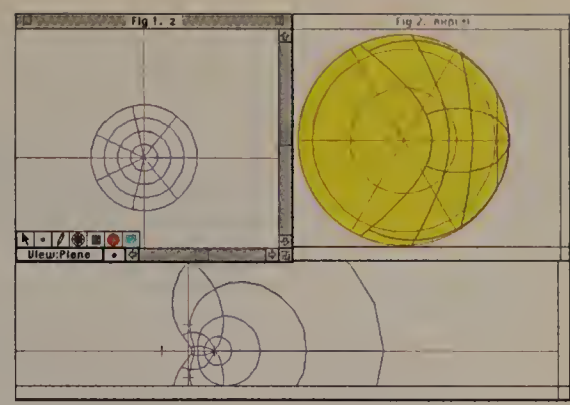
MW ★★★

A COURSE IN COMPLEX VARIABLES IS a traditional part of an education in math, physics, or engineering—it's a tradition that dates back to the foundation of both mathematics and the great state-engineering schools founded in France in the nineteenth century. The figures and exercises in most current complex-variables textbooks are, as a result of this reverence for history, barely distinguishable from those in the works of Augustin Cauchy, whose brilliant career ended in 1857.

The program f(z) aims to find a worthwhile computational and pedagogical role for the computer in the theory and application of complex variables. The main problem attacked by the program is essentially four-dimensional visualization: a function, $f(z)$, maps the geometry of a region (x,y) in one plane into another region (u,v) in a second plane. Sometimes the particular transformation or mapping represented by the function $f(z)$ is easy to visualize. These cases produce most of the figures you see in textbooks. When the transformation is not easy to visualize, you need the software.

All you need to do is specify the function domain in one dialog box, and your function $f(z)$ in another. The mapping can be drawn in color, black-and-white (the usual mode if you need printed output), on a plane, on a Riemann sphere, or as a 3-D figure when appropriate. There are commands for animation control and for shading, so you can design function plots to give you the best view of the real heart of a mapping. Version 6 includes built-in gamma and beta functions and lets you define very long functions, specify branching for logarithmic plots, display equipotentials, and read domain data from external disk files. In short, nearly everything one might have missed has been added to version 6.

The software also generates glorious Mandelbrot/Julia diagrams for fractal fans, but since it uses unoptimized floating-point computation rather than a faster, special-purpose integer-arithmetic algorithm, the results fill in slowly. It takes, for example, about half an hour to paint a 3-by-3-inch window with a basins-of-attraction computation on a IIci. The program needs a faster computation mode for these fancier graphics, if only to help users appreciate how Julia and root-finding techniques relate to the physics and engineering applications of complex analysis (they're not just a method for producing colorful T-shirts).



Easy z's The program f(z) not only generates plots of function mappings, but does it in animation mode, on spheres, and in color shadings.

This program costs slightly more than a textbook, and represents a truly negligible expense compared with the fees for a complex-variables course at most universities. Using the wireframe-type diagrams that traditionally represent complex functions, f(z) also runs fast enough to illustrate real-world applications in electromagnetism and fluid dynamics. Lascaux Graphics continues to be a leader in low-cost scientific computing.—CHARLES SEITER

HiQ 2.0

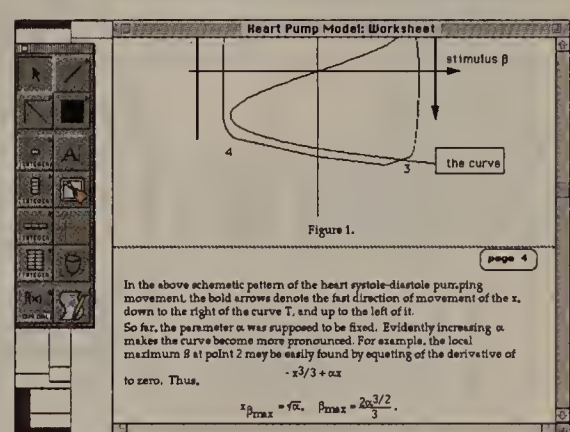
Numerical Mathematics Software

PROS: Fast, competent, thoroughly debugged numerical routines; easily learned interface; improved graphing. **CONS:** No third-party materials. **COMPANY:** Bimillennium Corporation (408/354-7511). **LIST PRICE:** $995.

MW ★★★★

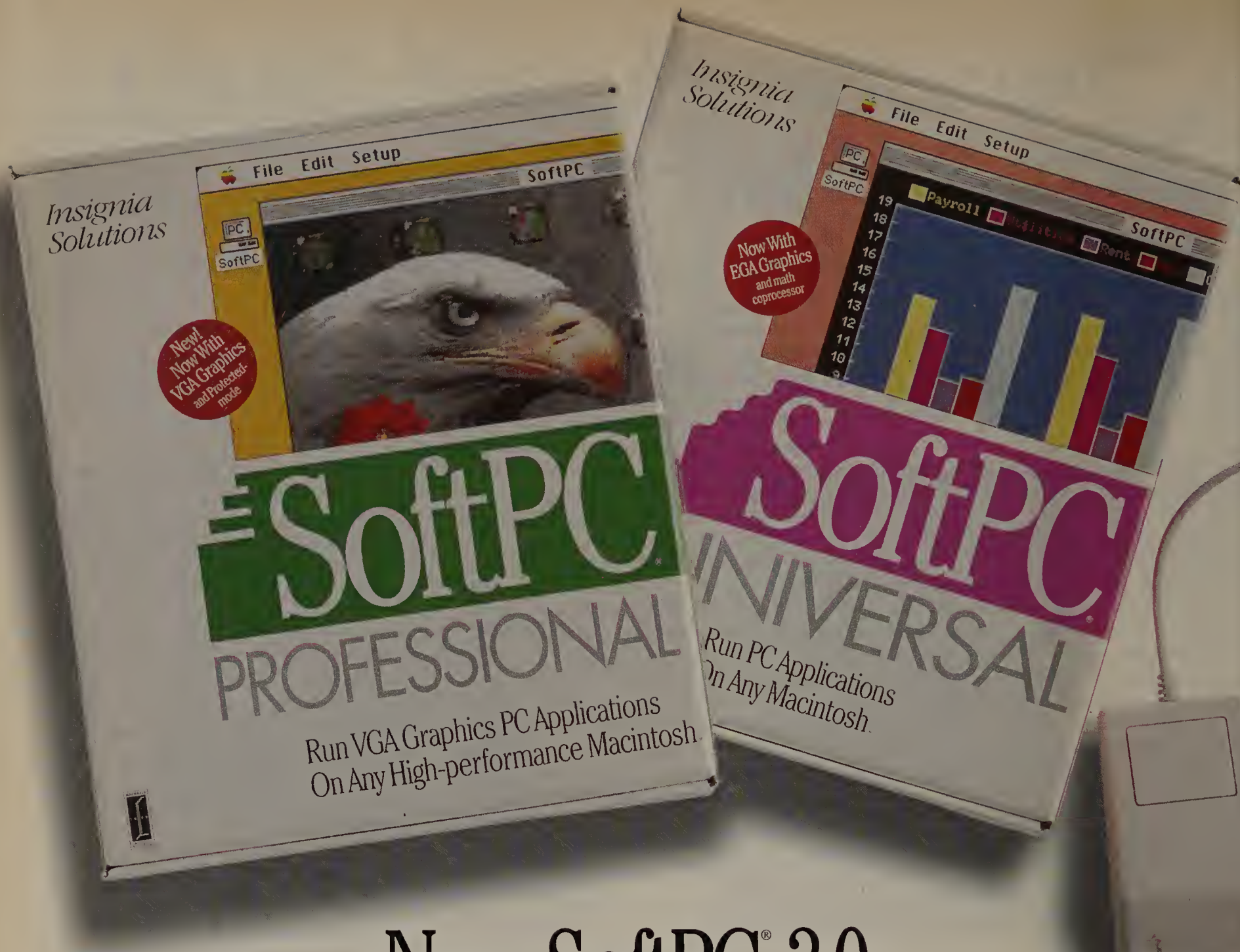
HIQ MADE AN IMPRESSIVE DEBUT IN 1992. It offered consistently faster calculations than any of its competitors, and it refused to crash on a variety of difficult problems that stalled other programs. The developers had clearly paid considerable attention to interface design as well; the Engineer's Notebook in HiQ proved easier to master than the interfaces of most math programs. At the time I also emphasized what HiQ is not (see *Reviews*, *Macworld*, October 1992). It's not Mathematica (or Maple or Theorist), since it doesn't handle symbolic math problems. In a way, it's like MathCAD on steroids (the application takes 3.2MB), except that MathCAD's current version now incorporates a subset of Maple's symbolic routines. HiQ has three great strengths compared with other programs: its differential-equation-solving section is very fast and capable; its matrix math capabilities are excellent; and its notebook format is a very natural interface—it's just like writing a report in which equations solve themselves (see "Murmurs of the Heart").

Version 2.0 adds some important features and improves several others. In HiQ version 1.0, data-import facilities were fairly primitive. Now a matrix stored in nearly any numeric format can be directly imported as the appropriate type of HiQ symbol. Since HiQ is a champion at curve-fitting and modeling, this improved access to existing experimental data really helps. In 2.0 you can have graphs automatically updated as you change equation parameters, and store the set of graphs as an animation. Overlays and contour plots are now easier to use, and animations of contour plots turn out to be an informative representation of equation solutions. The script editor now responds as fast as a good word processor, and the power of compiled scripts has been enhanced with an expanded function set. For example, there's a function that generates a partial derivative mesh on a 2-D data set, making it possible to write a simple one-page script that's equivalent to a finite-element modeling program. Finally, even though 2.0 is bigger than 1.0, most operations (particularly those involving programming loops) actually run faster. And the new package takes only 2½ inches of shelf space (the original HiQ package was bigger than a standard Mac monitor).



Murmurs of the Heart This HiQ notebook models heartbeat instabilities with a set of differential equations; the equations in the text are live, and parameter changes are reflected in the graph.

The only negative element in the HiQ world is lack of external support. The first version promised a large handbook of solved example problems in HiQ; apparently a corporate shake-up delayed this project. HiQ doesn't offer the large set of handbooks you can get with MathCAD, or the separate tool kits available for Maple, and of course HiQ has nothing like the massive assortment of third-party support materials produced for Mathematica. But for a large range of numeric tasks, HiQ is the right software.—CHARLES SEITER



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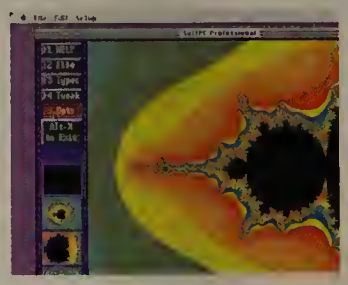

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ScanPlus Color 6000 for Mac

Color Scanner

PROS: Inexpensive; compact; good third-party software. **CONS:** Some blotching and grayness with color scans; only one SCSI port. **COMPANY:** PlusTek USA (408/980-1234). **LIST PRICE:** $749; with Color It and WordScan $899.

MW ★★★

SOME PEOPLE ARE ACCUSTOMED TO buying the latest Macintosh peripherals fresh off the assembly line and don't balk at paying top dollar. For the rest of us who unfortunately need to keep an eye on our wallets, the ScanPlus Color 6000 for Mac, from PlusTek USA, provides a welcome reminder that good things do come to those who wait.

The ScanPlus Color 6000 is a small, inexpensive, sheetfed color scanner. Its footprint measures just 9.5 inches by 13.25 inches, and it stands 3 inches high. The ScanPlus is capable of 24-bit RGB, gray-scale, and black-and-white scanning (reflective copy only, no transparency scanning) at up to 600 dpi. Its maximum scan area is 8.47 by 11.68 inches.

You can purchase the ScanPlus all by itself for $749, but the company offers a bundle including TimeWorks' Color It image-editing software and Calera's WordScan OCR package that at $899 is a pretty good deal. Neither WordScan nor Color It is the premier program in its category, but both work well, and the bundle saves you approximately $75.

Setting up the ScanPlus is essentially a plug-and-play operation. The scanner itself needs only to be attached to a power source and connected to the computer by means of a SCSI cable to be ready for use. The ScanPlus has only one SCSI port and therefore must always be the last device in the SCSI chain; that's a potential drawback if you have another device with the same requirement.

The included image-scanning software consists of a single plug-in module that can be used with any image-editing program that supports plug-ins (including Color It). Both Color It and WordScan use simple installer programs.

You adjust scanning resolution either through the keyboard or with a software slider bar. There's also an on-screen slider for adjusting the contrast on black-and-white scans. The ScanPlus scanning software allows you to prescan images and then use the marquee to select only the portion of the image you want to capture in the final scan. The initial scans on color images have an overall grayness, but this can be corrected in an image-editing program; Color It's autocontrast filter works especially well. I also encountered some noticeable splotchiness in the darker gray and shadow areas of color scans; gray-scale scans, however, do not have this problem. As with most desktop scanners, images benefit from some sharpening.

PlusTek's thoughtful design yields one bonus unusual in low-cost scanners. Because it's a sheetfed scanner, the ScanPlus is especially suited to OCR—there's no need to lift the lid in between pages. And since I'm something of a novice at OCR, I was pleased to find that WordScan is easy to use.

Although the ScanPlus is not appropriate for jobs where exact color matching is critical, it's nevertheless a good, economical color scanner. Its compact size makes it easy to place on a crowded desktop. It excels at repetitive jobs such as creating photo databases or OCR, and if you're sometimes frustrated because you need to digitally transmit printed materials that didn't originate on your computer, the ScanPlus Color 6000 may be the answer.

—MATTHEW NIELSEN

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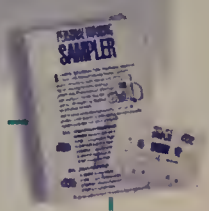

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Alchemy III

Molecular-Modeling Software

PROS: Fast, workstation-quality modeling; accepts and outputs data in every standard format. **CONS:** Doesn't follow standard Mac window conventions. **COMPANY:** Tripos Associates (314/647-1099). **LIST PRICE:** $950.

MW ★★★

THE MAIN DRAWBACK OF EVERY SOFTware-based molecular-modeling system for the Mac has been punky performance—Tektronix's hardware-accelerated CAChe system was for years the only acceptably fast modeler. Alchemy III is still not as fast as CAChe, but it's far less expensive, and on a Macintosh IIci or higher Alchemy III can model decapeptides and DNA fragments, in addition to the expected small molecules, with refreshing alacrity (see "Life Itself").

An Alchemy screen presents you with a Main window, in which molecules are assembled and viewed; an Auxiliary window that holds fragments and atoms (selected from Alchemy's generous assortment) for use in building your main molecule; a window of sizing and rotation controls; and a message area that's mostly significant for reporting the status of minimizations. The Build and Display menus are comparable to those in Tripos's big-computer program SYBIL, except that building a molecule is, if anything, faster and easier in Alchemy, and the space-filing views are especially vivid. Although molecular modeling tends to be associated with drug design and other aspects of organic biochemistry, Alchemy's full set of metal atoms and its ability to perform energy minimizations of metal-containing complexes make it useful to inorganic chemists, who, for that matter, are usually investigating compounds whose size is no challenge to a Mac.

Alchemy's energy minimizer uses six terms (bond stretching, angle bending, torsional deformation, van der Waals interaction, out-of-plane bending, and user-specified electrostatic interactions) and can handle fairly complex molecules (cyclic, peptide antibiotics, for example) if you can let it run for several hours. Alchemy supports export/import exchange with the standard modeling program MM2—you can take MM2 output files into Alchemy or build molecules in Alchemy and send them to MM2—as well as exchange with SYBIL, and Alchemy accepts input from the Brookhaven Protein Databank and crystallographic coordinate-data.

Against this array of virtues, the absence of a close box or even a Close command for the Main window would not seem to be a major flaw, but in practice it can drive you to distraction; similarly, since there isn't a New command under the File menu, from time to time you find yourself quitting the program and starting it again to get a clean drawing space. Parts of this program's interface were established on other machines before the Mac even supported color, but these window-management aspects simply need to be updated. Nonetheless, at the primary tasks for which scientists buy molecular-modeling software, Alchemy III is today's Macintosh champion.
—CHARLES SEITER

Life Itself In Alchemy III, you can rotate a fair-size DNA fragment on a Mac screen as fast as you can move a mouse, a feat that called for a scientific workstation just a few years ago. Building large molecules is also straightforward and quick.

Spyglass Transform 3.0

Scientific Visualization Software

PROS: New version includes graph annotation, better data import, link to Mathematica, and a macro facility; nearly instant color-table and plot-style changes. **CONS:** Macro system is fairly difficult; overlay use requires practice. **COMPANY:** Spyglass (217/355-6000). **LIST PRICE:** $595.

MW ★★★

TRANSFORM 3.0, LIKE ITS EARLIER VERsions, is the best Mac program for representing large two-dimensional data sets. This might sound like a limited ambition, but most of the important scientific data in the world exists in two-dimensional data sets (even 3-D data is a stack of 2-D slices). Furthermore, most of it exists on computers other than the Mac. The Spyglass strategy is to provide every possible data-input path from other computers to the Mac (and now to Unix machines also), and to use the Mac as a highly interactive display device.

Version 3.0's most important new extensions concern connections to other file types and programs—in the earliest versions of Transform your best bet was to hope that your data could somehow be written out to an HDF (hierarchical data format, a supercomputing standard) file before Transform saw it. You can now control input parameters, headings, and formats of ASCII text tables much more easily than in previous versions. The program now automatically opens GIF, PBM, and XWD files. If your data set as imported has missing elements, 3.0 now offers Kriging in addition to plain interpolation and fill options. Besides importing MatLab files directly, Transform 3.0 supports Mathematica's MathLink (System 7 is required), so you can write functions in Mathematica and plot them automatically in Transform. This is quite important; most installations that have Transform probably have Mathematica as well, and it's much easier to manipulate plots in Transform's interactive environment than in Mathematica's mostly procedure-oriented graphics world.

Transform allows more control over presentation features such as tick marks, axis labels, and titles—formerly the program decided all this for you from data it found in the source data table. Although it's possible to make real presentation graphics by creating overlays in other programs, you may resent the time you spend trying to get things just right. The program still needs a few simple built-in drawing tools for direct creation of overlays.

A power-user enhancement in Transform 3.0 that could likewise call for a modest injection of user-friendliness is the new macro facility. Since most Transform users are familiar with either C or FORTRAN programming, or both, the basic macro commands and rich mathematical function set will find immediate application in advanced image manipulation (you could in principle program most of the functionality of both Adobe Photoshop and high-end DSP programs in Transform macros). But programming is done in a plain-text Notebook window, with no type of debugging or code-checking help, which makes it a chore to code macros more than a few pages in length. A macro recorder would also help with automating low-level chores. Nonetheless, the macro language constitutes an image-manipulation processing tool of amazing scope.

Transform can access data stored in every common format, offers some useful presentation-graphics features, and includes a programming language with a large range of built-in high-level scientific functions. If you need to visualize large quantities of tabular data, Transform 3.0 is not quite the only game in town, but it's the only one worth playing.—CHARLES SEITER

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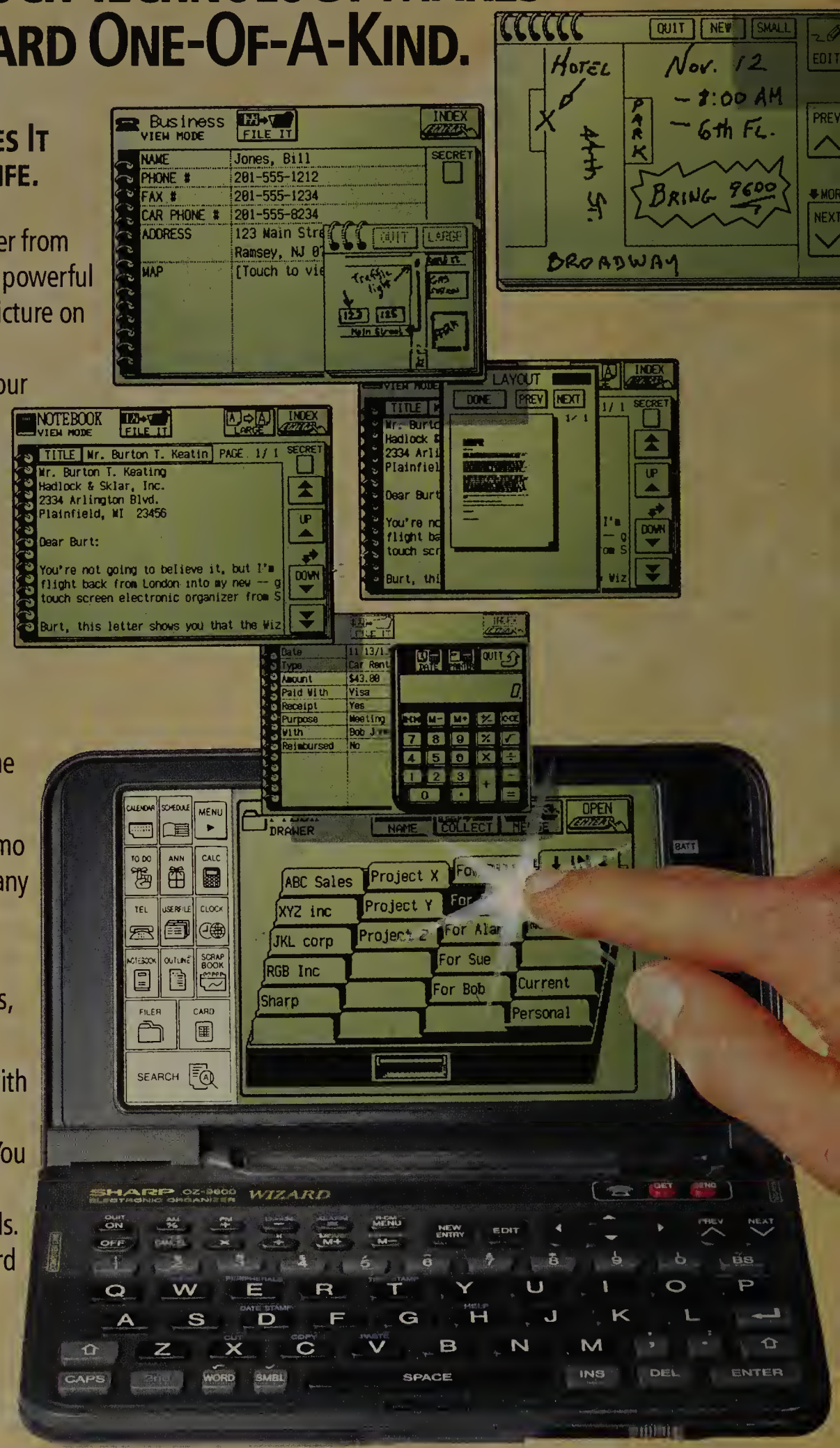

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LabTutor 2.0

Tutorial on Laboratory Computer Interfacing

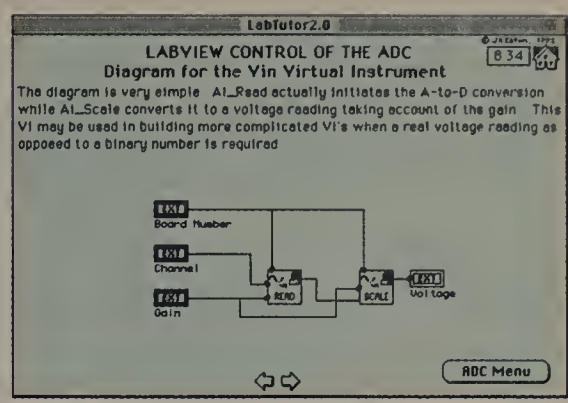
PROS: Detailed, thorough exposition of computer interfacing in general; specific training on basics of LabView. **CONS:** Requires LabView and National Instruments interface board to perform exercises. **COMPANY:** J.K. Eaton (415/723-1971). **LIST PRICE:** $50.

MW ★★★

SOMETIME IN THE 1980S, COMPUTERS began to replace dozens of familiar laboratory instruments. In the old lab methodology, a researcher would often wire experimental inputs (from, for example, a photocell or thermocouple) directly to a chart recorder to observe changing analog values over time. In the new style, the analog voltages from a transducer are wired to an analog-to-digital converter (ADC) and then from the ADC to a computer; through software, the computer can impersonate not just a chart recorder but an oscilloscope, lock-in amplifier, or nearly any other piece of electronic lab hardware. National Instruments' LabView is a popular Mac program for this purpose, offering hundreds of "virtual instruments" in software; LabTutor is a guide not just to the use of LabView but to ADCs, DACs (digital-to-analog converters), interfacing in general, and postacquisition signal conditioning. It's the best exposition of this material I've seen, and I've been obliged to follow this area since 4-bit microprocessors were the state-of-the-art.

LabTutor was developed at Stanford University for use in undergraduate and graduate mechanical engineering courses, but is perfectly qualified as a study-by-yourself guide to the mysteries of interfacing. Its bargain price, nobly enough, reflects mostly the cost of disk duplication, manual production, and handling; the project that produced LabTutor was funded by Apple and the National Science Foundation, so you've already paid for part of it, indirectly.

Consisting of 11 sections, LabTutor begins by assuming no background in interfacing at all. Seven of the lessons cover general topics (including ADCs, DACs, parallel digital interfacing, the General Purpose Interface Bus, and advanced methods in signal conditioning), while three are LabView-specific (LabView basic operations, virtual instruments, and GPIB boards programmed with LabView). Partly because LabView has set the tone for modern data-acquisition products, LabTutor is a good introduction to other products as well (Strawberry Tree International's Analog Connection, for example). The step-by-step coverage of AD interfacing basics—including the often neglected area of cabling details—is outstandingly clear, and the sound signatures used to illustrate concepts in waveform analysis are truly helpful.



Ins and Outs LabTutor is an introduction to both analog-to-digital and digital-to-analog conversion, emphasizing National Instruments' LabView and the virtual-instruments approach to software interfacing. As Einstein recommended, things have been made as simple as possible, but no simpler.

It may be just a large (more than 1MB) HyperCard stack with a manual, but LabTutor is an outstanding example of HyperCard resources used intelligently. If you will be expected to use a computer in a laboratory setting (with or without LabView), or want to make your life really easy as an instructor in an interfacing course, get LabTutor right now.—CHARLES SEITER

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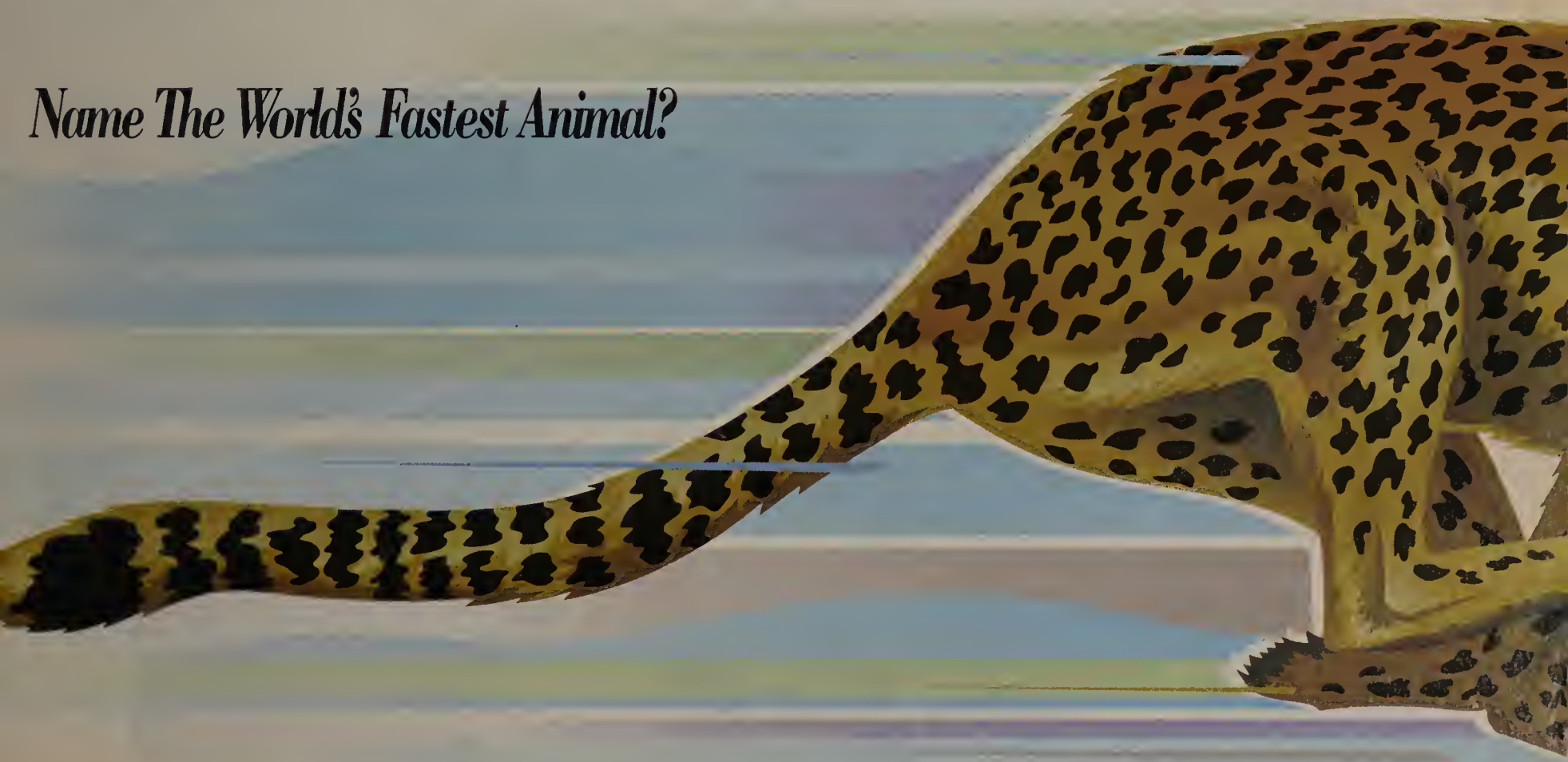

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Magic Typist 2.0

Glossary Utility

PROS: Automates typing of repetitive keystrokes; Auto-Learn feature works as you type. **CONS:** Clunky interface; awkward Phrase Editor; some functions work erratically or not at all in Microsoft Word. **COMPANY:** Olduvai Corporation (305/670-1112). **LIST PRICE:** $129.

MW ★★

I LEARNED TO TYPE WHEN I WAS 11, more years ago than I care to remember, and I sometimes wish, at the end of a long typing session, for a better way. Although I learned the craft reasonably well, entering letters on a keyboard by hand is probably a relic from the nineteenth century. I'm reminded of the scene in the motion picture *Star Trek IV—The Voyage Home* where Scotty sits before an old Mac, places the mouse to his mouth, and barks "Computer."

Magic Typist from Olduvai tries to automate and simplify the process of typing recurring phrases. It consists of an extension, two applications (Magic Typist and MT Mover), and a set of standard library files. The extension installs in the System Folder and monitors keystrokes as you type. In normal typing, as you type the root letters of a word or phrase stored in a library, a dialog box appears, allowing you to finish the word or phrase either with a single keystroke or automatically.

In Auto-Learn mode, Magic Typist automatically adds words above a preset length to its library as you type them. The Phrase Editor lets you manually enter new words or phrases, or import them from a text document. The interface is command-line based (invoking images of DOS), but it's flexible. You can include return keys, cursor movements, and tabs; delete characters; and even establish basic text formatting, such as bold or italic, in your stored phrases. An Auto-Numbering feature automates entering numbers in sequence.

You can choose different library files, or, with the MT Mover application, add libraries created in a standard word processing program.

This program may not please fast typists, who are likely to be put off by the flurry of flashing menu bars (or beeping sounds, depending on the kind of notification chosen) as they type along. Hunt-and-peck typists, or those who have limited use of their hands, may appreciate the ability of Magic Typist to finish a word or a phrase.

Although the program performed as advertised for the most part, I noticed a few quirks in Microsoft Word when Magic Typist was active. Whenever a word or phrase was suggested in the Magic Typist window, the screen would redraw, whether I accepted the suggestion or not. Olduvai technical support blamed a programming workaround in Word, but the redraw is nevertheless irritating. I was also unable to invoke the Learn dialog box in Word, even when I used the ⌘-option-1 alternative suggested in the Magic Typist manual. Keyboard entry speed in Word also seemed noticeably slower, even on a Quadra 800.

The documentation and technical support were flawed. The Learn dialog box, for example, doesn't look quite like the one described in the manual. In some places, System 7's balloon help is implemented only with placeholders, such as "6C" in the Preferences window. When I asked Olduvai technical support about this quirk, they insisted that balloon help isn't available in Magic Typist.

Despite these reservations, if you want to speed up typing of repetitive phrases, if you're a slow typist, or if you have an injury or disability that prevents you from having full use of your hands, for now Magic Typist may be a useful addition to your software library. That is, until *Star Trek*'s talking computers can do it all for us.

—GENE STEINBERG

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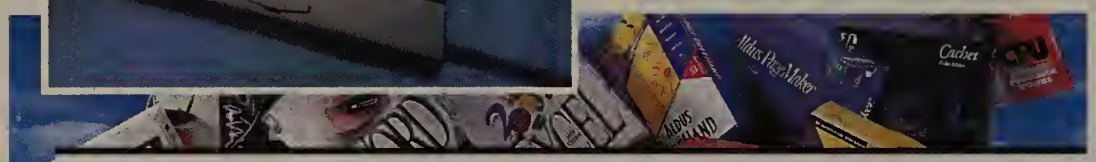

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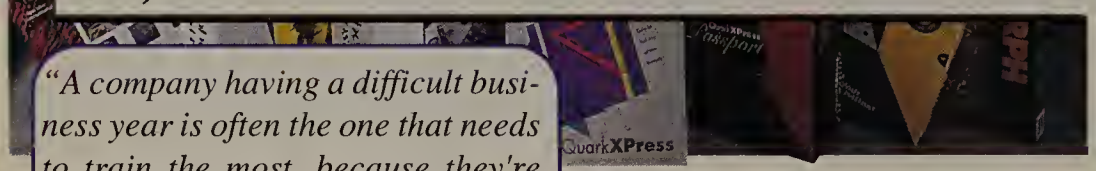

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- QuarkXPress (1) ☐
- QuarkXPress (2) ☐
- QuarkXPress (3) ☐
- Using PowerBooks (1) ☐
- Using PowerBooks (2) ☐
- WordPerfect (1) ☐
- WordPerfect (2) ☐

$49/ea.

MacAcademy Training Videos

$49/ea.

Circle 106 on reader service card

Dycam Model 3

Digital Still Camera

PROS: Compact; easy to use; economical; compatible with DOS/Windows PCs. **CONS:** No color; mediocre image quality. **COMPANY:** Dycam (818/998-8008). **LIST PRICE:** $895.

MW ★★★

PHOTOGRAPHY IS GOING DIGITAL. Kodak's Photo CD system lets you put your own photos on a CD-ROM disc. High-end color printers produce prints that look like photographic enlargements. And several companies have introduced digital still cameras that take crisp color images without film.

The Dycam Model 3 is not among them. The Model 3 is a low-end digital camera—at $895, it retails for a fraction of the price of color digital cameras from Canon, Sony, and Kodak, whose wares are aimed at newspaper and catalog photographers. The Dycam Model 3 is designed for humbler applications that don't require color or hairsplitting sharpness: photographing real-estate listings, documenting insurance claims, creating photo ID badges. For these jobs, it's a winner.

The 10-ounce Dycam Model 3 is about the size of a cheap paperback book, so it fits comfortably in an inside jacket pocket or purse. Alas, it doesn't have a lens cap, so you might want to carry it in something that protects the 24mm, f/4.5 fixed-focus lens. (The lens is roughly equivalent to a 70mm lens on a 35mm camera—a mild telephoto. Wide-angle, telephoto, and close-up attachments are sold separately.) Inside the camera are some chips and a rechargeable battery that powers the flash and stores up to 32 photos.

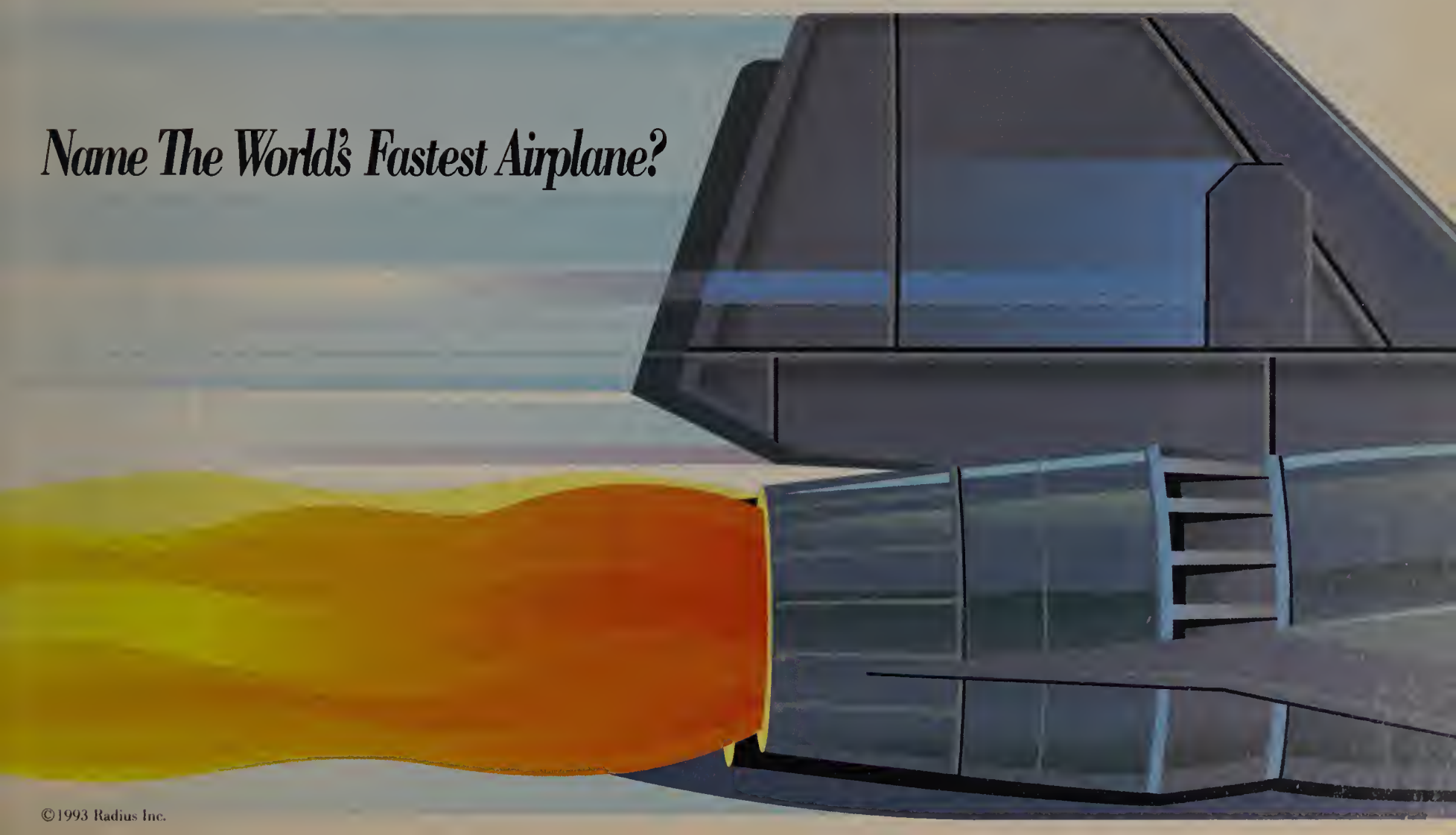
The Model 3 is what some photographers call a PhD ("press here, dummy")—no focusing or exposure adjustments are needed. Press the front-mounted shutter button, and an electronic click lets you know when you've got the picture. A built-in electronic flash goes off if there isn't enough light. You can also disable the flash by running a utility on the Mac while the camera is connected to it.

You wouldn't want to use this puppy to capture fast-changing action scenes. About two-thirds of a second elapses between the time you press the shutter button and the exposure itself, and then it's nearly ten seconds before the camera is ready to take another picture.

When you get back to the office (or PowerBook), you can attach the Dycam Model 3 to a modem or printer port and download the photos to a hard drive. The Dycam software makes this easy, displaying an on-screen contact sheet showing thumbnail versions of each image. Double-click on a thumbnail, and the Mac retrieves the image from the camera. Another command retrieves and saves all photos on the hard drive, naming them automatically.

The software also provides some rudimentary image-processing features. You can lighten, darken, sharpen, blur, and resize images. (An image's standard size is 365 by 496 pixels—roughly 5 by 8 inches.) If need be, you can save the Dycam images in PICT or TIFF format and then open them in a more capable image editor.

The Dycam Model 3 poses no threat to the high-end digital cameras, but it's a solid product that works as advertised. (It also convinced me that J. Q. Public is eager for digital photography—everyone I showed the Model 3 to marveled at the notion of a camera that didn't require film.) If you need high-quality color images, consider a camera such as the $4500 Canon ESP (see *Reviews*, *Macworld*, April 1993). But if Instamatic-grade gray scale meets your quality requirements, buy the Dycam Model 3. The money you save will pay for an awful lot of film. And if you have a scanner and are close to a one-hour photo lab, you might just want to stick with your conventional camera.—JIM HEID



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The Journeyman Project

CD-ROM Game

PROS: State-of-the-art graphics and sounds; well-developed plot. **CONS:** Extremely slow; copy protected. **COMPANY:** Presto Studios (619/689-4895). **LIST PRICE:** $99.95.

MW ★★★

WHEN SPACESHIP WARLOCK CAME out two years ago, it defined a new genre of entertainment software: the interactive movie on CD-ROM. In The Journeyman Project, as in Spaceship Warlock, you watch a science-fiction epic unfold through the eyes of its hero. You view the world through a biotech implant—a cybernetic spectacle that houses view screens, control panels, artificial-intelligence modules, and multipurpose bio-chips that are the twenty-fourth-century equivalent of Batman's utility-belt gizmos.

The world you see in the Journeyman Project is an interactive work of art. Every scene is rich with painstakingly detailed graphics. Elaborate 3-D models, subtle textures, photo-realistic lighting, and QuickTime movies make the Journeyman world seem almost real.

The Journeyman Project's original musical score intertwines with digitized sounds ranging from realistic to otherworldly. The sound-track mood changes with the story line. For example, when you run low on oxygen in the mining caves, high-energy music slows to a crawl, and your breathing and heartbeat become nerve-wrackingly loud.

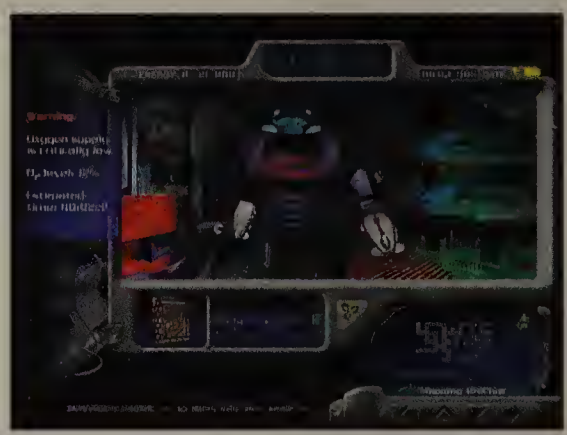
The point-and-click interface is easy to understand and use. You use the mouse to move forward, change direction, open a door, or activate an object.

The complex story line takes a while to unfold, but you eventually learn that it's up to you to travel back in time to prevent an unknown force from tampering with history. There are several paths through the story, and two ways to solve many of the problems you encounter.

The story has all the makings of a classic sci-fi nail-biter, but it's hampered by The Journeyman Project's major flaw: a sluggish, erratic pace. Every time the excitement starts to build, the game hits a speed bump while more dazzling pictures and sounds are copied from the CD into the computer's memory. It would have helped to be able to copy chunks of the game onto the hard drive to accelerate the action. But unfortunately, we don't happen to have 400MB of free space, and the game cannot be subdivided.

It takes several hours to complete the game, and you spend much of that time waiting for the next screen. Is it worth the wait? Father George loved the dazzling audio-visual environment but grew impatient with the puzzles and the pace. Teenager Ben became so wrapped up in the Journeyman plot that he didn't mind waiting to find out what happened next.

We both agree that The Journeyman Project redefines the state of the art in interactive adventures, but we also agree that we need a faster CD-ROM drive.
—GEORGE AND BEN BEEKMAN



Face-off During one of your Journeyman time trips you confront this nasty-looking robot in the Norad military base.

Star Wars VisualClips

QuickTime System-Beep Utility

PROS: Fun; great movie clips; movie stops with a mouse-click. **CONS:** Movies require plenty of hard disk space. **COMPANY:** Sound Source Unlimited (805/494-9996). **LIST PRICE:** $89.95.

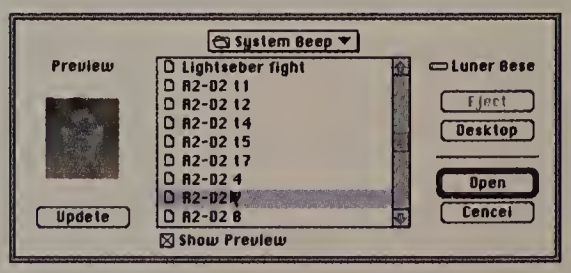
MW ★★★★

MODERN TECHNOLOGY IS WONderful. First my Mac quacked when it was unhappy; later it said "uh-oh" anytime I did anything particularly stupid; and now R2-D2 appears on my screen, clicking, whirring, and humming reprovingly. Star Wars VisualClips makes all this possible.

Star Wars VisualClips, described on its About screen as "the system beep for the video generation," is a collection of QuickTime movie clips taken from the movie *Star Wars*, plus the QuickTime extension and a control panel, Video Beep, that lets you play QuickTime movies at various system events.

The clips are great. Like all QuickTime movies, they're small and fuzzy, but they're also delightful. There are 62 clips, over 16MB of movies. A slew of R2-D2 clips show the robot chirping cheerfully, squealing in anguish as he's shot by the Jawas, and purring away as he repairs Luke's fighter. Other clips include the band in the bar, the hologram of Princess Leia, Obi-Wan turning off the tractor beam, and a variety of spaceships including TIE Fighters, X-Wings, Imperial Cruisers, and of course, the *Millennium Falcon.*

Assigning movies to events is simple. In the control panel you first select an event, such as shutdown or restart. You then click on either the Add Movie button or the Add Folder button and make your choice from a standard selection window. One of the nicer features of the selection window is that when you choose Add Movie you get a preview box that, when checked, shows a still image from the movie. You can use the control panel's Play button to see the whole movie once you've assigned it to an event. You can assign several movies to one event, if you like, and have VisualClips randomize their order.



R2-D2 in the Desert If the initial preview picture isn't clear, the Update button changes it to an image from later in the movie clip.

The other features on the control panel are also straightforward. A slider bar controls the sound volume for each clip; a check box turns Video Beep on and off. The screen button lets you select the monitor location where the movies will play. Your options are the four corners and the center, or you can let the program decide. I recommend that you make the choice; one of the best features of VisualClips is that you can click on the movie anytime during play, and it will promptly disappear. My response time was definitely faster when the location of the movie was predetermined.

Why am I suggesting ways to avoid seeing the movies, at the same time as I recommend this product? Well, it's fun to have Han Solo saying "Don't everybody thank me at once" when you insert a floppy disk, but if you're installing a program that comes on 12 disks (like VisualClips itself) it gets old quickly. The flexibility that lets you stop playing a movie clip gives VisualClips a longer life span on your computer.

VisualClips is a toy, but if you have the money, the hard disk space, and the RAM, this is the kind of totally cool toy that will make you remember why you love your Mac.—WENDY SHARP

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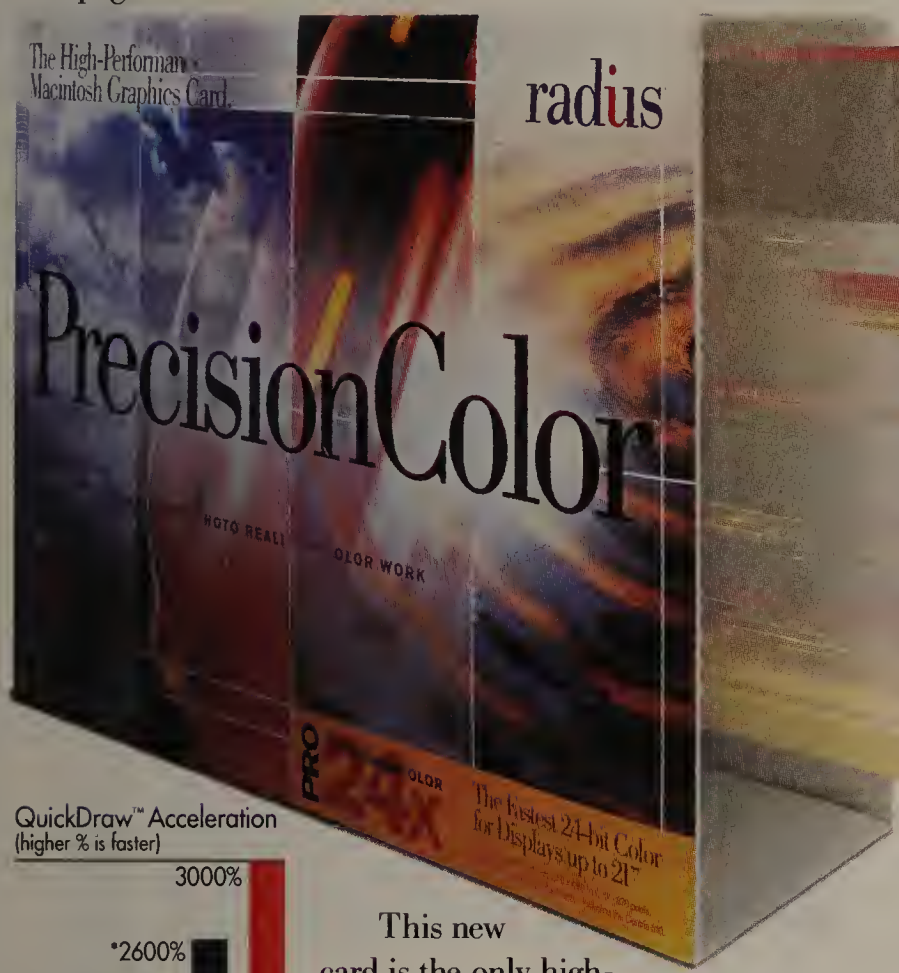

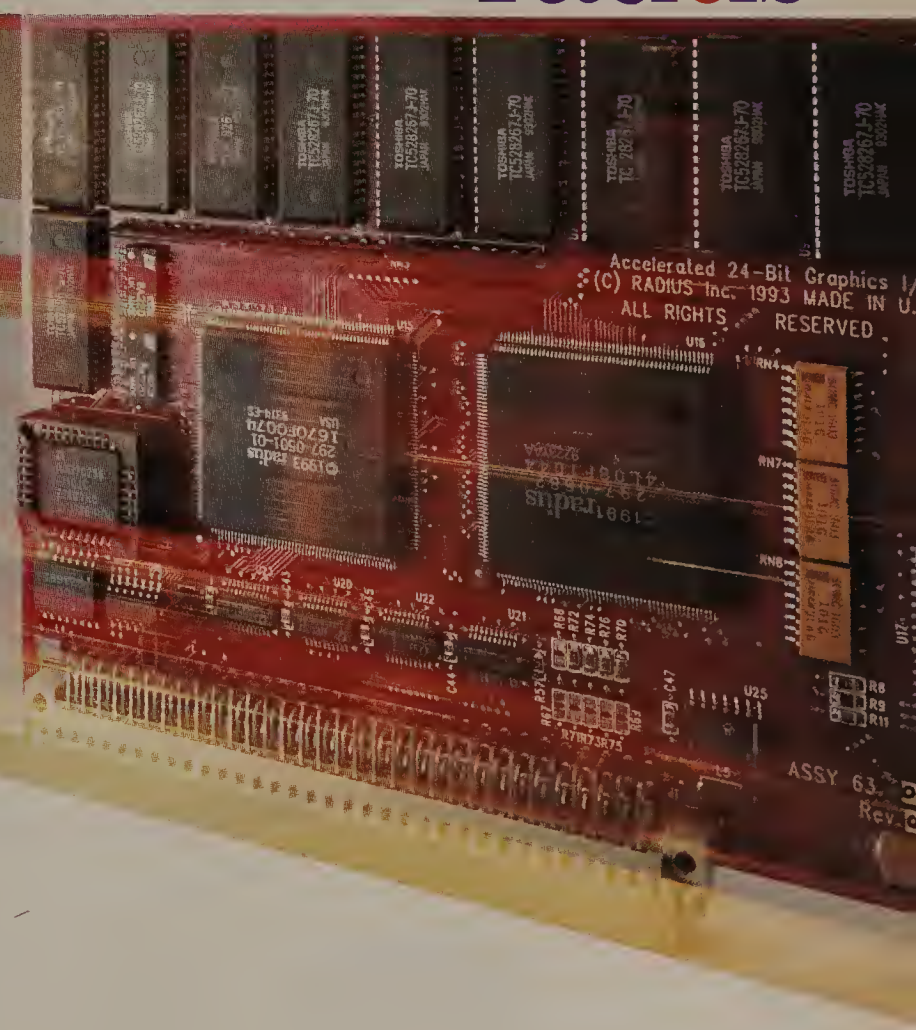

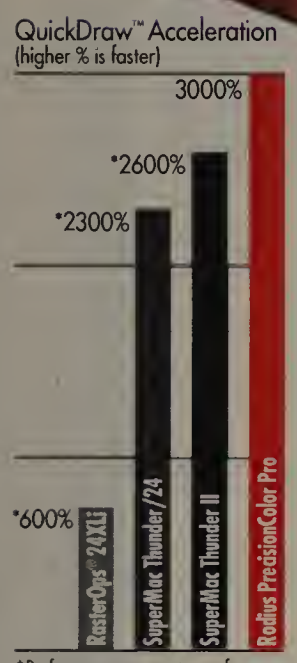

*Performance percentages from publications by RasterOps Corp. and SuperMac Technology, Inc.

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Circle 14 on reader service card

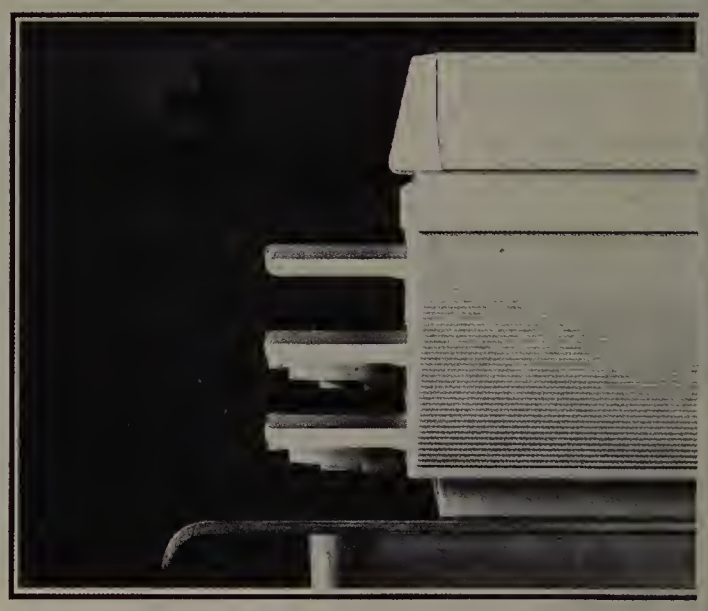
THIS SHOULD GIVE YOU OF WHY WE CREATED A

The image you see over there started out attached to the image you see over here. But as this document made its way down to the printer, the Macintosh it was created on recognized a small problem: 11 x 17 pages can't fit through 8½ x 11 printers.

And so, out came the electronic scissors.

Now, if you're like many Macintosh users, you know all about this routine. And you know how it feels to walk into a meeting with a layout that contains hours of blood, sweat and tears, and a fat strip of tape right down the middle. Enough said.

Introducing the new COMPAQ PAGEMARQ Laser Printers. A line of



machines that can print 11 x 17 pages in a single pass. And because they come with up to three paper trays, these printers also let you switch between paper sizes without ever leaving your desk. So you don't have to pull one paper tray out and replace it with another, only to have your neighbor repeat the process two minutes later. And for

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A PRETTY GOOD IDEA
11 x 17 LASER PRINTER.

people whose design ambitions extend beyond Helvetica Bold, PAGEMARQ Printers offer two ways to expand your type library, eliminating the need to

continually download from your Macintosh. You can add 1- and 2-MB Programmable Font Modules, and store as many as 40 additional fonts. Or you can add an internal 60-MB Hard Drive, and store everything from Avant Garde to Zapf Chancery—as many as 1,500 fonts.

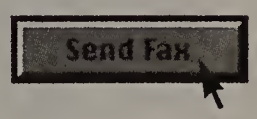
All of which print with amazing clarity thanks to the 800 x 400 dpi high-resolution mode—a feature that delivers razor-sharp type and graphics as well as smooth, high-definition gray scales.

Of course, the new COMPAQ PAGEMARQ Laser Printers are fully backed by CompaqCare, our extensive service and support program. Which includes a one-year, on-site* limited warranty as well as unlimited phone support. All at no additional charge whatsoever.

If you're interested in learning more, simply call 1-800-345-1518 in either the United States or Canada.

We'll show you how to keep your big ideas in one piece. At least until your client sees them.

A typographer's dream, these printers can store 1,500 fonts. Of course, not all of us dream about type. In which case, the 35 fonts that come standard are more than adequate.



Add an Internal FAX Modem and you can turn your Mac into a personal fax machine. One that will send and receive PostScript quality faxes in any size up to 11x17.

COMPAQ

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Circle 20 on reader service card

by Cary Lu

A SMALL Revelation

Newton has arrived—at long last

After more than a year of buildup, Apple has finally delivered the Newton, its first all-new computer in nearly ten years. Apple calls the Newton a personal digital assistant (PDA), perhaps to avoid scaring off possible buyers who are not computer literate. Don't be deceived. The personal computer of the future may resemble the Newton—part scratch pad, part electronic secretary, part hand-held communicator—more than the Macintosh.

Who needs this $699 device? You do, if you juggle several constantly changing daily appointments or to-do items, frequently develop new business contacts, often have to leave your office, are a cellular-phone addict, and enjoy adjusting your work style to accommodate an interesting gadget. If you like Sharp's Wizard, you will love the Newton.

Given those criteria, the Newton MessagePad, as the first Newton model is called, is far from a necessity for most people. But as the price comes down and the product improves, the Newton and competing devices could become standard personal appliances.

Key Features

The Newton MessagePad performs several key tasks.

- It captures and interprets handwriting and sketches that are drawn directly on its screen with a simple plastic stylus.
- It organizes and files information about people and events in an address book, a to-do list, and a calendar.
- It communicates via modem, fax, radio pager, infrared remote-control beam, local area network, and serial port.

These abilities are fully integrated, linked to a single database, and preprogrammed to help increase speed and reliability. Everything fits in a 1-pound box the size of a trade paperback book.

Handwriting

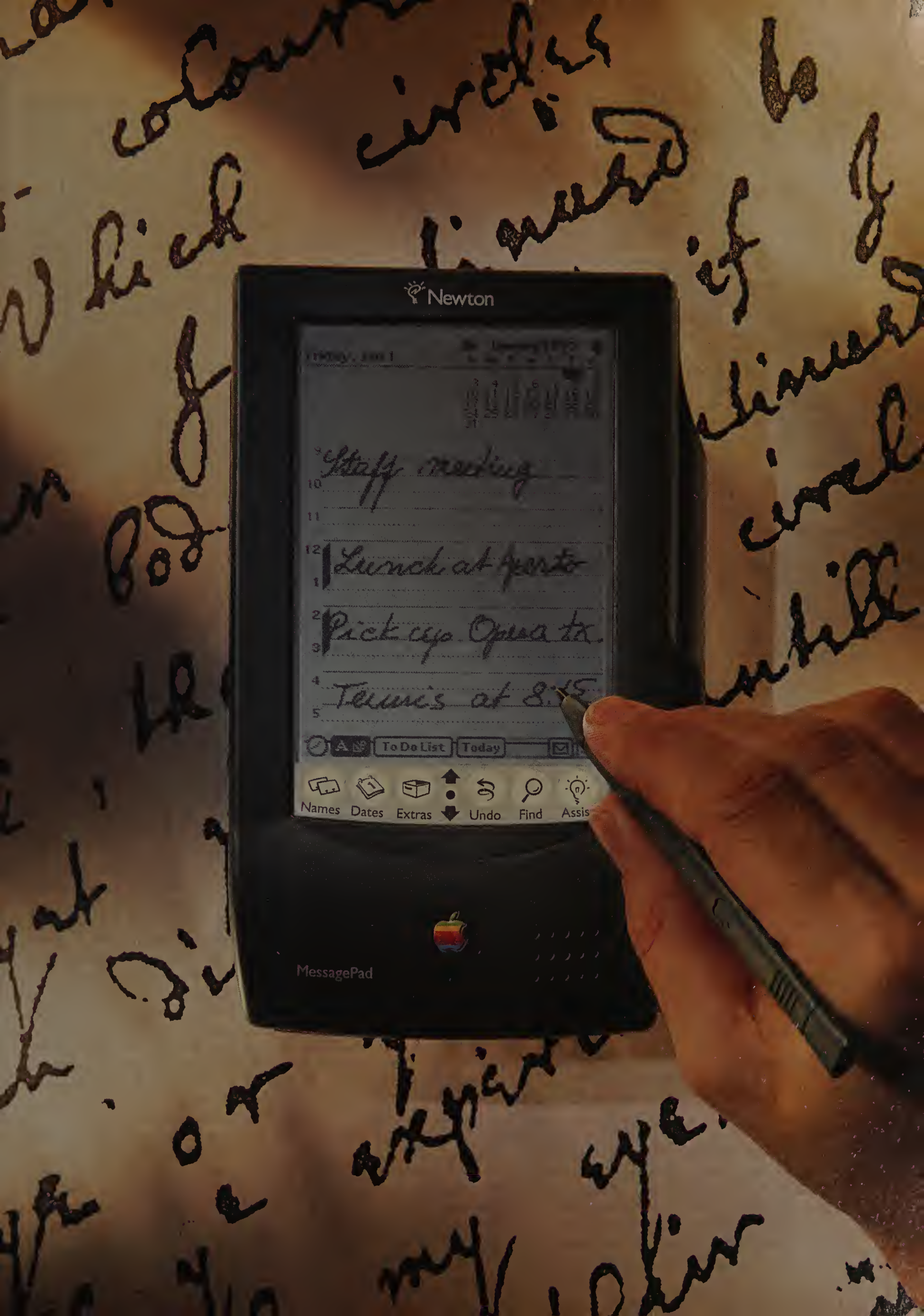
The first striking feature of the Newton is the pen interface. When you turn on the Newton, no keyboard, obvious operating system, or Finder greets you, aside from a handful of icons. You simply write with a plastic stylus on a pressure-sensitive pad that overlays the LCD screen. The screen behaves like an endless roll of paper that you scroll up and down. The plastic stylus contains no electronics; any pointed object—even a fingernail—that doesn't damage the pressure pad will do (see "How the Newton Makes Its Mark").

You can either print or write cursively—in theory, at least. (The Newton converts writing to a built-in serif or sans serif font at 9-, 10-, 12-, and 18-point sizes.) The Newton's recognition software, developed by ParaGraph, a Russian company, is far from perfect. You'll need to practice with the shape of letters and with timing. Pauses put spaces between words, so you must not pause within a word.

To improve and speed up recognition, a preferences screen allows you to select a written example of each letter, number, and common symbol that most closely matches your handwriting. The Newton stores your preferences. But the Newton isn't trainable: your handwriting must conform to its range of standard preferences. If you write an *A* as a squiggle, expect to edit the Newton's interpretation just about every time.

A few people who have tested the Newton either can't or won't adapt to its range of acceptable handwriting. Plan to spend 15 minutes or more with the Newton to give it a fair handwriting test. If your handwriting proves too tough, the Newton can display a standard keyboard on screen for you to tap out letters one by one. Of course, if this is what it takes to get a point across, why buy a Newton?

Since the Newton's recognition draws on words in its spelling list, you must add proper names and other new words to the list, a simple but time-consuming process. The Newton normally uses word recognition rather than pure character recognition to improve transla-


Newton
Staff meeting
Lunch at Aperto
Pick up Opera tx
Tennis at 8:15
To Do List
Today
Names
Dates
Extras
Undo
Find
MessagePad

tion accuracy. But this approach comes at the expense of some writing freedom; you can't use abbreviated words unless you first add them to the dictionary. Classical shorthand won't be usable unless someone develops software to recognize it.

You can, however, turn off word recognition and run simple character recognition, although accuracy drops. You can also slow down recognition to improve accuracy. To refine your notes, the Newton uses a variety of *gestures*, a pen computer's equivalent of standard editing commands.

If you draw a horizontal line across the screen, the Newton automatically time- and date-stamps the line, which corresponds to the entry below it. Everything can be searched by the time stamp. The Newton can also recognize graphics. If you draw an approximation of a straight line, the Newton renders a straight line; Newton also cleans up squares, circles, and irregularly shaped objects through its graphics-recognition system.

Nine basic command icons sit at the base of the display, including scrolling, undo, and find. A tiny speaker reinforces some actions; crossing out something produces a soft *pop*.

You can also turn off the text and graphics recognizers and simply write or draw. The Newton stores those images as graphics objects called digital ink. Stored images are bitmaps—the Newton cannot perform handwriting or graphics recognition on digital ink. Digital ink works well for quick notes and sketches, since you don't have to wait for recognition or deal with a spelling list.

Newton's Versatile Ports Newton offers storage expansion with a PCMCIA slot (with card inserted, top photo), and connectivity through an infrared remote-control transceiver (to the left of PCMCIA slot) and a serial port (bottom photo, far left, with cable inserted). An AC adapter port (bottom photo, with power cord inserted) sits between the serial port and the pen carrier.

The Intelligent Assistant

The Newton's electronic-secretary features are another major selling point. If you write "lunch Friday with Joseph" on the notepad and tap the Assist icon, the Newton automatically blocks out an hour at noon next Friday with Joseph. But in case of a conflict, Newton will not notify you. It checks the database for all Josephs; if there are more than one, the Newton displays the options (see "Lunch Dates Made Easy").

Additional software could eventually extend the process—such as asking which restaurant you want and then faxing a reservation request. For a standing lunch date each Friday, the Newton could automatically call a taxi and warn you when it's time to leave.

The Newton's association of *Joseph* in a memo with *Joseph* in the address-book database mimics the intuitive association a person would make—you know who Joseph is in both situations. Contrast this with what a personal computer "knows" if you write *Joseph* in a word processor file: the computer cannot connect the name with a database entry or calendar appointment. The Newton treats the word *Joseph* as an object, and the object-oriented software in the Newton can identify and link *Joseph*s in any context. Once you point to *Joseph* with the stylus, you can instantly see other *Joseph* objects—in the address book, Joseph's membership on a committee, Joseph as author of a report, correspondence that Joseph wrote or received. Object orientation offers such compelling advantages that it will probably become a standard feature of most computers.

Hardware Features

The Newton offers these capabilities in a package that fits inside a roomy pocket. The box is dominated by a 4-by-2.8-inch supertwist LCD screen with 336 by 240 pixels (85 dpi). The screen has no backlighting, but if you have enough light to read comfortably, you can operate a Newton.

An Advanced RISC Machines (ARM) 610 processor running at 20MHz drives the Newton. Apple says that the ARM 610 offers computing ability comparable to that of a Quadra 800, and with far lower power consumption. (The ARM 610 cannot run Macintosh software, however.) The Newton needs such computing strength to manage handwriting recognition and object management efficiently. Core Newton software resides in 4MB of ROM; 640K of true static RAM serves dual functions as active memory for the CPU and to store data.

There are no internal expansion provisions. Expansion must be done from the outside. One PCMCIA Type II slot supports up to 64MB of RAM or ROM for storage; such cards run about $300 (for 2MB) to $850 (for 10MB, the largest available). PCMCIA ROM cards can store applications, electronic books, or any other electronic information. Although PCMCIA cards can contain miniature hard drives, modems, and network interfaces, none of these will work with the Newton until special driver software is available.

Unlike with conventional hardware accessories, you can install and remove PCMCIA cards while the Newton is running. The operating system dynamically adjusts to accommodate any changes, so an address book automatically expands if you insert an address-book card—say good-bye to cumbersome import-export routines. But many users will crave a second PCMCIA slot—so they can add RAM and view an electronic book in ROM simultaneously, for example.

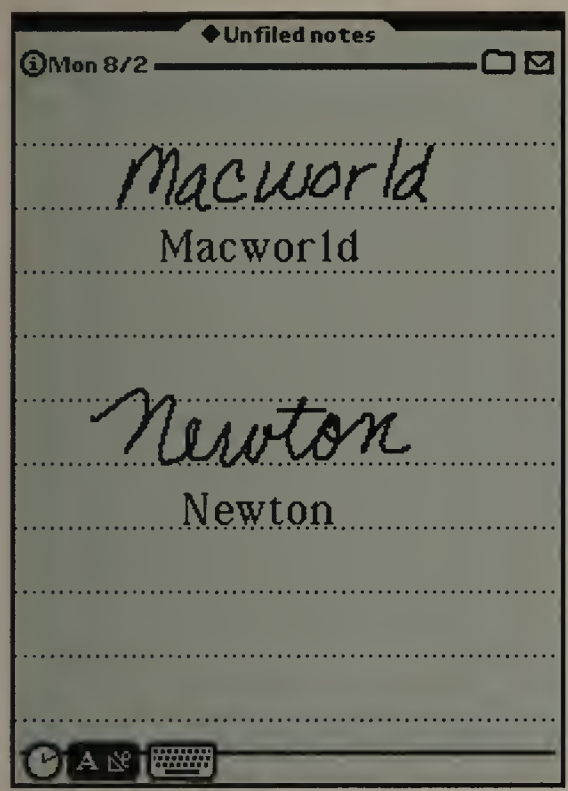
The Newton operates on four standard alkaline AAA batteries, a rechargeable nickel-cadmium (NiCad) battery pack, or an AC adapter. The worst-case battery life (alkaline batteries)—for continuous, high activity—is six hours, according to Apple. For intermittent operation, Apple says, alkaline batteries should be good for about two weeks. NiCads should last for a week.

The AC power-supply trickle charges NiCads inside a Newton overnight; for a faster charge, Apple sells an external battery charger ($49, including one NiCad battery pack). Lithium button cells in the Newton keep internal memory alive for about six months or more until they must be replaced—an essential feature because the Newton contains no storage drive, holding all data in RAM or ROM.

Connections

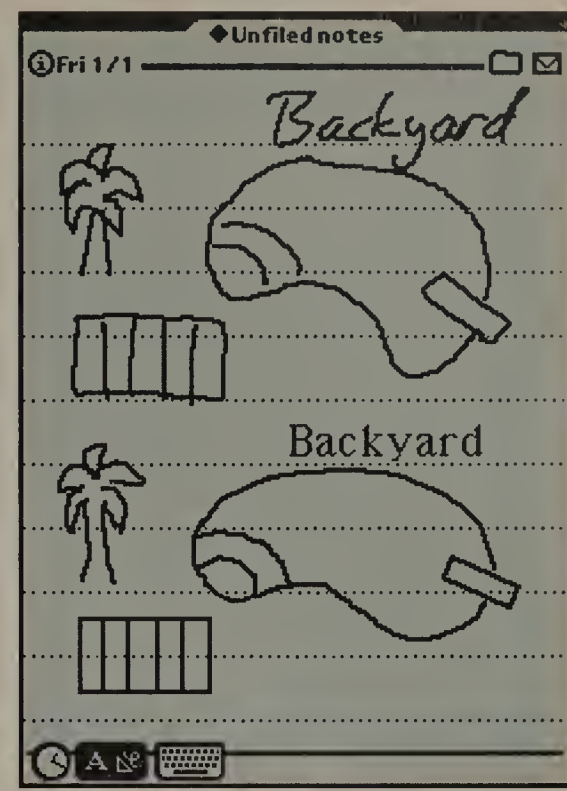
The Newton offers many types of communication. The single serial port acts like a Mac's serial port. It supports LocalTalk and uses a standard 8-pin serial connector for modems and printers.

Support for a data and fax modem is built into the Newton software; Apple offers an external $149 modem with 2400



Handwriting Recognition The Newton recognizes both printed and cursive handwriting. It date-stamps any text or graphic when you draw a straight line at the beginning of the entry.

Improving Recognition To increase the Newton's recognition accuracy, Apple provides a Preferences screen that allows you to specify the way you normally render each letter and number.



Improve Your Drawings The Newton's graphics-recognition talents include cleaning up uneven lines if desired. The bottom figure is the Newton's recognized and corrected version of the top sketch.

bps for data, 9600 bps for fax. However, in the first software release, the Newton cannot receive a fax even though the modem can.

The Newton has NewtonMail electronic mail built in, however. Beginning sometime this fall, NewtonMail will run on a remote server managed by Apple. Using a modem, subscribers can send any notepad item—including graphics—to another Newton, or send text messages to any Internet-compatible address.

The Newton can drive a PostScript or StyleWriter printer through its serial port or over a network. To connect to the parallel-port printers common to DOS and Windows computers, Apple offers the optional $99 Newton Print Pack, a serial-to-parallel-port converter cable with driver software stored.

Apple offers the Newton Messaging Card (which plugs into the PCMCIA slot), a radio paging receiver that displays alphanumeric messages on the Newton screen and can automatically place the message in the Newton's to-do list. (The card's price was not firm at press time.)

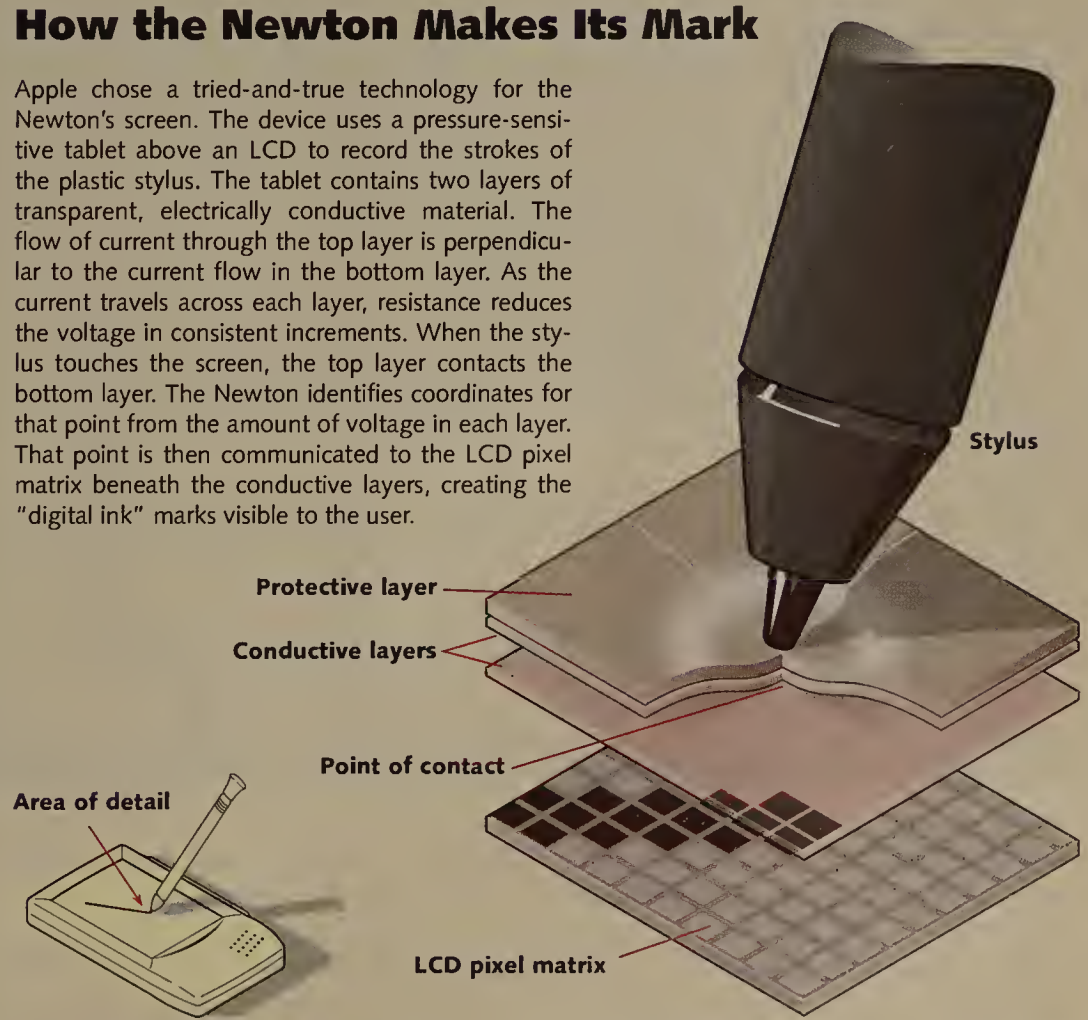
A keyboard can also be connected via the serial port for intensive text entry, but most people likely to be interested in this would do the work on a standard computer and move the info to the Newton.

The Newton's infrared (IR) transceiver sends and receives data at up to 9600 bps over a distance of 1 meter. The transceiver is compatible with other Newtons and the Sharp Wizard 9600, and eventually will work with transceivers in future desktop computers. The transceiver can also control home-entertainment equipment—TVs, VCRs, CD players—making the Newton the world's most expensive channel-surfing device.

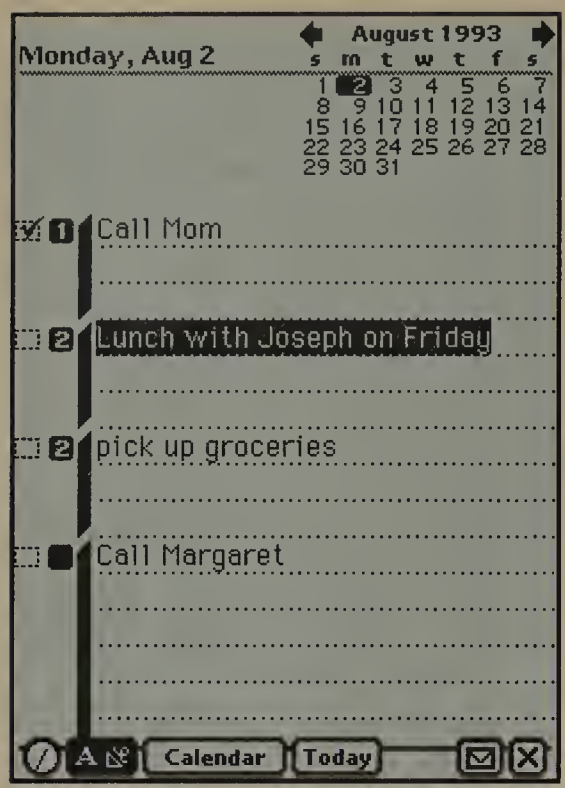
The Newton can synchronize its information with a desktop computer (Mac or Windows) through the IR transceiver, with a serial line, or via LocalTalk. Apple's $129 Newton Connection Kit software duplicates all the Newton's functions—except pen input—on a Mac or Windows computer. This can help coordinate records between the Newton and the desktop. The $199 Connection Pro version adds import and export features to popular desktop applications.

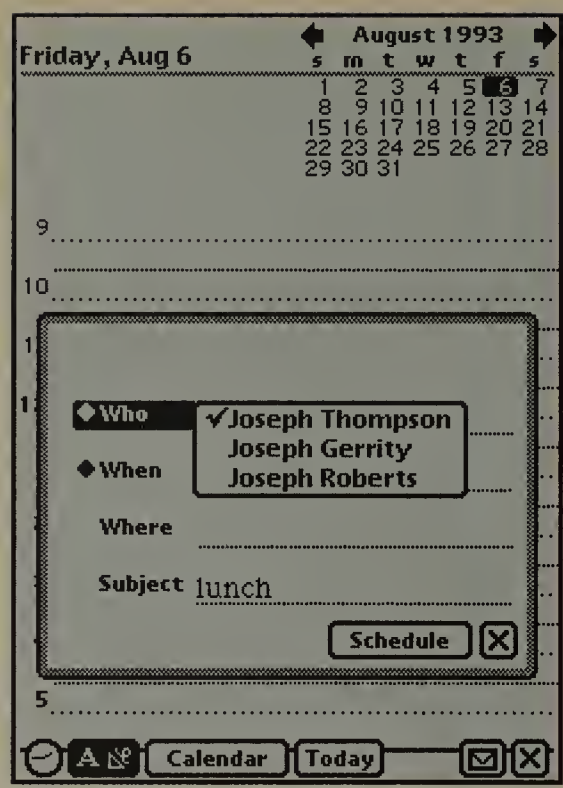
How the Newton Makes Its Mark

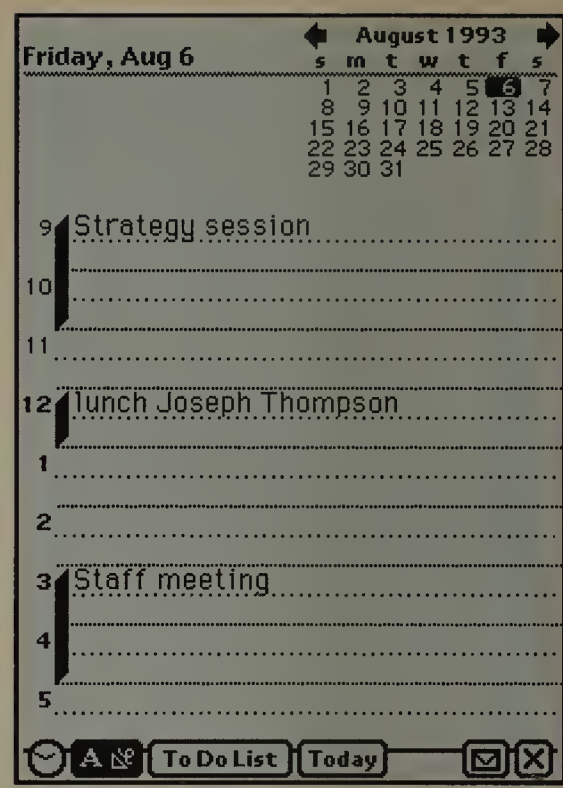
Apple chose a tried-and-true technology for the Newton's screen. The device uses a pressure-sensitive tablet above an LCD to record the strokes of the plastic stylus. The tablet contains two layers of transparent, electrically conductive material. The flow of current through the top layer is perpendicular to the current flow in the bottom layer. As the current travels across each layer, resistance reduces the voltage in consistent increments. When the stylus touches the screen, the top layer contacts the bottom layer. The Newton identifies coordinates for that point from the amount of voltage in each layer. That point is then communicated to the LCD pixel matrix beneath the conductive layers, creating the "digital ink" marks visible to the user.



Lunch Dates Made Easy







The Newton's object-oriented database integrates personal notes, address books, and calendars to make scheduling easier, faster, and more flexible than with typical desktop programs. To make a lunch date on Friday with Joseph, for example, first highlight the reminder previously entered into your to-do list (left). The Newton automatically displays the screen showing the correct date for the lunch appointment from its calendar. If you have more than one Joseph in your database, the Newton automatically displays your options (middle). After you specify the correct Joseph with a touch of the pen, the Newton schedules the appointment (right). The Newton would double-book you, however, if you already had a lunch date that day.

The Newton can also dial phone calls, either using the dialer built into a modem or through a built-in speaker if you hold it up to the telephone mouthpiece.

Competition

Many companies are introducing PDAs and pen-based computers, though few of these compete directly with the Newton. Pocket organizers like the Wizard accept pen input for graphics only. Pen-enabled computers are standard computers with modest changes in system software and applications to recognize pen input for text, sketching, and pointing. Several companies offer laptops with Windows for Pen Computing from Microsoft, a pen layer over Windows.

Direct competition for the Newton comes from the Zoomer, a $699 PDA jointly developed by Casio and Tandy (and sold at Radio Shack stores). The Zoomer resembles the Newton but understands few graphical editing commands and doesn't accept cursive handwriting. PowerInk, the Zoomer's version of digital ink, plays a greater role, on the assumption that few users need or want to perform recognition on notes. Unlike the Newton, the Zoomer lets you write first in PowerInk and run recognition later. The Zoomer's underlying data storage does not link objects and lacks a digital assistant that tries to understand what you have written. Instead the Zoomer follows a paper notebook model; to schedule lunch with Joseph, you must write the date and time.

The forthcoming WinPad PDA from Microsoft and Compaq will have more features than the Zoomer, but it will be an adjunct to Windows computers rather than an independent PDA.

For now, the other main competitors come from several pen-computer models that use the PenPoint operating system from GO Corporation. EO Corporation (415/903-8100), now an affiliate of AT&T, makes the most interesting of these devices. EO models cost from $1999 to $3299 and incorporate a hard drive with 20MB to 64MB storage capacity; one unit has a backlit screen. Over the next year or two, simplified EO computers and more-elaborate Newtons will compete head-to-head.

Like the Zoomer, the PenPoint operating system performs character recognition and allows deferred recognition. In my informal tests, the Newton has better handwriting recognition; but remember that no two people have identical handwriting. Run your own tests.

Future Newtons

In coming months, look for Newtons with additional memory and mass-storage abilities. Imagine a Newton that displays fully formatted documents for editing and annotation. Through the communications links, you could share comments and changes with coworkers; when done, the document could go directly to everyone in the company who needs it.

Apple plans to deliver a second and perhaps a third Newton model this year, and has discussed several design concepts:

- A Newton built into a telephone that provides call management.
- A tiny, 3-by-5-inch Newton notetaker.
- A Newton architectural sketchpad, with a large screen and enhanced drawing-recognition features.
- A child's Newton with games and learning activities.

Sharp, manufacturer of the first Newton, is also a Newton licensee and plans to introduce its own Newton model, similar to Apple's, later this year. Kyushu Matsushita Electric, a subsidiary of Matsushita, says it will offer its own Newton models within a year.

Feeling skeptical about this first Newton's limited hardware and small screen? That's how many people reacted to the first Mac. Bear in mind that the seamless, object-oriented approach in the Newton will be a major feature of Pink (a future operating system from Taligent, the Apple-IBM joint venture) and the forthcoming Windows Cairo system from Microsoft. Handwriting recognition in an intelligent assistant is a vital step toward making machines conform to human needs, standards, and styles, rather than the other way around. And while the Newton's system is far from perfect, it works well enough to make a frenetic schedule a little more manageable—and a little more fun. **m**

Contributing editor and *PowerBook Notes* columnist CARY LU is the author of *Apple Macintosh Book* (Microsoft Press, 1992).

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African Elephant: Profile
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You can distinguish an African elephant from an Asian one by their larger size, bigger ears, and by their "swaybacked" look. If you get close enough, you can see that African elephants have two prehensile projections at the end of the trunk, while Asian elephants have one. These projections act like fingers and can pick up small objects like a twig, a leaf, or a flower. The well-muscled trunk can lift a tree.
Page 1 of 1
African Elephant: An Earful"
Cooling Off
Macintosh
LC 520

MW LAB

Apple packs low-cost performance into an all-in-one design

The Macintosh LC 520

Just when you thought you knew what to buy, Apple presents you with yet another midrange choice. As this is written, the new Macintosh LC 520 will be offered in the United States only through the educational channel. However, it's probably just a matter of time before the LC 520 is offered through consumer channels as a Performa or through dealer channels as an LC 520. In the meantime, expect a lot of folks to ask their favorite student or teacher to buy one on their behalf.

At first glance, the LC 520's specs look like those of existing Macs: a 25MHz 68030 processor, 5MB of RAM, an 80MB hard drive, a 14-inch color monitor, and a 300-KBps CD-ROM player. But a second look shows two significant differences: all this stuff comes in one box, and it costs about $1600, at least for educational institutions. The price for individual students and teachers will depend on the campus outlet they get it from. Still, that's a breakthrough price.

The LC 520 is just one part of an Apple strategy to speed up development of new models. Rather than wait a year or so to see if a new model has caught the public's fancy, Apple has shortened its development cycle drastically, sometimes offering a different repackaging of ingredients only three or four months after a previous product launch. That's more like the behavior of a consumer electronics company and less like the old Apple. It's a bit confusing and hectic—even we at *Macworld* barely managed to publish an analysis of the LC III (in our April 1993 issue) before we were called down to Cupertino, California, for the LC 520 preview—but at least prices appear to be falling rapidly as a result. That means more innovation, although delivered incrementally, at affordable prices.

A Total Package

The computer chip itself is the ubiquitous 68030, with the respectable (but not exactly breathtaking) clock speed of 25MHz, operating on a 32-bit bus. There's a socket for a 68882 math coprocessor, a Processor Direct Slot (PDS), and space for up to 36MB of RAM. (The LC 520 takes the new 72-pin SIMMs used in the Centris family, LC III, and Quadra 800.) That sounds exactly like the LC III—and in terms of performance, Macworld Lab tests show that the two machines are essentially the same (see the test results, "Comparing the LC 520's Performance"). The LC 520's SCSI and video ports are also the same as the LC III's, while the LC 520 offers two ADB ports, compared with the LC III's one.

The main difference between the LC 520 and the LC III is the LC 520's bolted-on multimedia support.

• **Built-in Color Monitor** Not only is a Trinitron-based 14-inch color monitor (the same as used in the high-quality Macintosh Color Display) built into the LC 520 case, but also the logic board includes

BY CHARLES SEITER

Inside the LC 520's New Integrated Design

Snap-off back cover

New Slide-in hard drive

Slide-in logic board

Built-in microphone

Built-in monitor displays 16-bit color; includes power-saving standby mode

New Slide-in CD-ROM drive

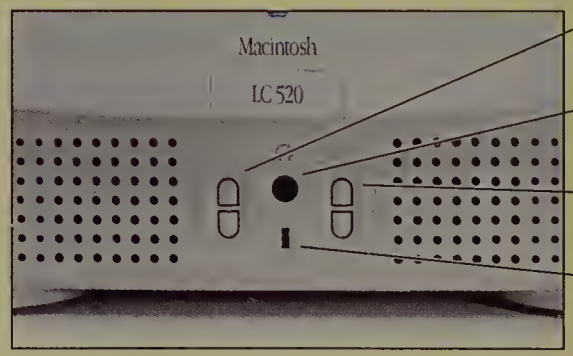
New Built-in stereo speakers, phone jacks, and sound controls

New Slide-in floppy drive

New Snap-off front cover

Built-in Multimedia

The LC 520 is designed for multimedia applications, particularly for use in education, so it comes with an internal CD-ROM drive, a built-in 14-inch Trinitron monitor, and enough VRAM for 16-bit color display. The built-in microphone, stereo speakers, volume controls, and stereo phone jack are all front-mounted for easy access.



Brightness controls

Stereo phone jack

Volume controls

Power indicator

Slide-in hard drive

Power connectors

Drive connectors

Slide-in logic board

RAM (36MB maximum)

VRAM (768K, for 16-bit color)

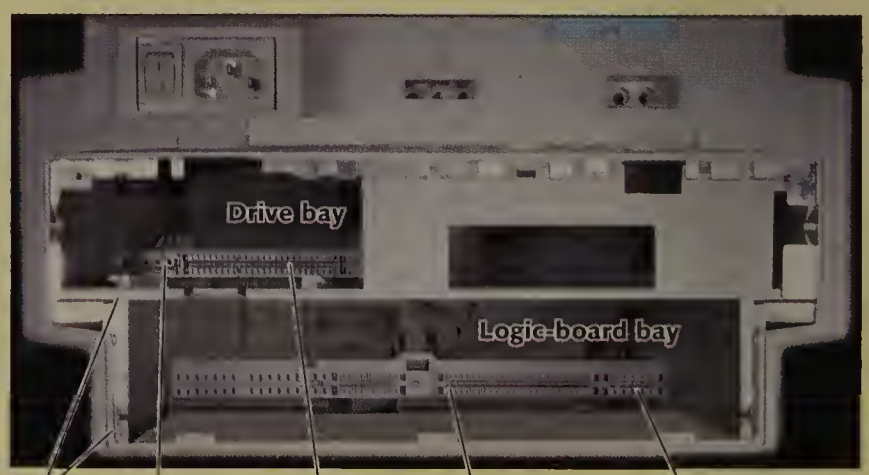
25MHz 68030 processor

System connectors

Power connectors

True Plug-and-Play

The LC 520 is designed to be easily maintained through the use of slide-in components, like the hard drive, that are easily accessed via snap-off covers. Initially, drives with the new type of no-cable connectors will be available only from Apple. The all-in-one design minimizes the loss of cables and other components, thus helping schools ensure that their Macs remain functional.



Guides | Drive power | Drive slot | Logic-board slot | Logic-board power

APPLAUSE FOR APPLE'S EDUCATION MACHINE

Apple's new all-in-one Macintosh sounds like a promising computer, in theory. But what do analysts and educators think about the built-in CD-ROM drive, single-plug design, and audio capabilities? The people *Macworld* spoke to were uniformly positive about the machine, although several were disappointed that the LC 520 doesn't have a built-in video-out port or built-in Ethernet.

"It's going to be a very hot machine for Apple," according to Holly Brady, editor-in-chief of *Technology & Learning*, a magazine that covers technology in K–12 schools. "Schools have been waiting for a well-priced machine that includes a CD-ROM drive because there's enough software out there now." Moreover, plug-and-play is important to schools, which don't have the kind of technical support businesses take for granted.

"Schools have been living with Apple II's for a long time," says Brady. "They have been in the process of upgrading to Macs. This machine is very well priced for the features it provides." Still, the LC 520 has its drawbacks. The biggest problem Brady sees is the lack of a video-out port. "In the schools, you need easy ways to get the image on the screen up on a larger screen so that 30 students can view it at a time," she says.

Anne Wujcik also believes the LC 520 will get a warm response from customers. "The integration of a lot of power and functionality into one machine is a real solution for a lot of teachers," says Wujcik, president of Wujcik & Associates, a market research firm specializing in education. Still, she would have liked to see Ethernet support. "I am convinced that networking is of essential importance to the K–12 market. Every Mac has AppleTalk built in and that's fine for small application sharing. But this is a multimedia machine, and kids are going to be manipulating QuickTime and video . . . More and more schools are getting into networking."

The absence of built-in Ethernet support "is a bit of a limitation, especially at a time when schools are aggressively adding local area network capability," says Sal Capozzi, an analyst with Market Data Retrieval, which focuses on the education market. "We just did a survey that showed that LANs in schools have grown 100 percent in the past year."

Despite these small limitations, Mark Share bought 110 of the computers in June for a new model school and expects to acquire roughly 900 more during this fiscal year.

"There's very little not to like about the machine," says Share, director of educational technology for the Scottsdale, Arizona, public schools. "It provides on the desktop all the tools people have been talking about except built-in video out, which is probably coming."

Share lauds the single-cable concept and small footprint, important in a classroom with limited space. He also likes the high-quality monitor used in the LC 520, the double-speed CD-ROM player, and the added bonus of the speakers. Best of all is the bill—he calls the $1600 price tag "astounding."

768K of video RAM, for 32,768 colors. There's no provision for 24-bit color (unless you buy a 24-bit graphics board designed for an LC's PDS; Lapis Technologies [510/748-1600] offers such boards), but then again, the best available physiological evidence suggests that 24-bit color may be optical overkill, and the color scope of the LC 520 will work nicely in any likely multimedia applications.

• **Built-in CD-ROM Drive** The next big multimedia element is a double-speed CD-ROM drive (the internal AppleCD 300i), which supports multisession Photo CD and audio discs. Apple's drive is fairly fast, as Macworld Lab tests have shown (see "Double-Speed CD-ROM Drives," *Macworld*, July 1993).

• **Built-in Audio** The audio quality is impressive, since the LC 520 features Apple's first built-in stereo speakers—it's a shock to hear clear stereo coming from the front of a low-cost Mac. There are also stereo phone jacks at the front of the case, plus push-button volume controls. There's an internal microphone behind a tiny hole in the top of the monitor housing, as the Color Classic has.

Not only is there really not much else to buy—except for more RAM or ultimately an accelerator—there's also not much to lose. Schools dislike the snarls of cables and cords that currently connect multiple devices at each LC station. Life is also easier in the classroom without separate microphones, CD-ROM drives, or even monitors that might wander from room to room or out the door. At 40 pounds in a single lump on the desktop, this box is likely to stay put.

The LC 520 will also be sold to consumers in Japan and Canada. Apple believes the all-in-one, fairly compact design will appeal to the space-conscious Japanese. The Japanese have also embraced multimedia more than Americans have, according to Apple's comparison of CD-ROM drive sales, so Apple believes the LC 520 will sell well in Japan. The company also expects the machine to do well in education and multimedia markets in Canada.

The single-plug design and potentially low retail price also appeal to the home market, so we expect to see the LC 520 eventually offered (as a Performa or under its own name) to a wider market.

The Eye of the Beholder

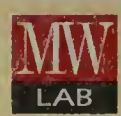
The LC 520 is a stylistic departure from Apple's tradition of clean, brick-shape computers. As radically different from the Color Classic as the Color Classic was from the Classic II, the LC 520's design raised eyebrows among *Macworld*'s editors and designers. But there are some good reasons for the boom-box-of-the-future low-front case.

• **Up-Front Controls** First, this design incorporates the two stereo speakers behind the graduated hole-grids on the case's right and left sides. Second, little up-down buttons for volume and monitor contrast are also set into the front panel, because, Apple says, that location makes it easy for students to operate the most-used controls, but it also makes the LC 520 even more convenient as a general-purpose multimedia platform.

• **Easy Service Access** Another feature of this new industrial design is easy access to both the logic board and the various internal pieces of drive hardware. The front bezel pops off after you remove two screws, and you can pull out the floppy drive and CD-ROM unit, connected to the bus by snap-in edge connectors rather than by a socket and ribbon-cable arrangement (see the diagram, "Inside the LC 520's New Integrated Design"). Similarly, the back snaps off the LC 520 (in a design modeled after the Color Classic), and you can pull out the logic board or the hard drive with no fuss and no tools.

This is the easiest computer to service that Apple has ever built. Computer-lab supervisors in schools across the country are going to love the LC 520. If only such drive connections and logic-board access had been standard a decade ago.

The only functional drawback to the design is that the monitor's position is not adjustable. Fortunately, there are plenty of books in classrooms to slip under the case to adjust the viewing angle.



Comparing the LC 520's Performance

Fastest result in each test. Products are in alphabetical order.

SYSTEM PERFORMANCE

Times as fast as a Classic. Longer bars are better.
The rankings below let you determine the overall processing power of a Mac compared with any other Mac.

LC-ORIENTED TASK PERFORMANCE

Times in seconds. Shorter bars are better.
These results compare the performance of various Macs for different types of tasks. The tasks chosen represent typical business work done by LC users.

Common
We timed typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

Scientific
We added to the common tasks several scientific calculations that use floating-point math.

Processor
We timed several tasks in Claris FileMaker, ClarisWorks, Deneba UltraPaint, Microsoft Excel, and Microsoft Word.

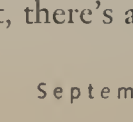
Drive-Access
We timed file opens in Microsoft Excel and Word, and disk-based sorts in Claris FileMaker.

Video-Display
We timed horizontal and vertical scrolling in ClarisWorks, Microsoft Excel, and Microsoft Word.

Floating-Point
We timed scientific recalculations (which use floating-point math) in Microsoft Excel and ClarisWorks.

*With optional math coprocessor installed.

BEHIND OUR TESTS



To gauge the latest Mac's basic performance, Macworld Lab compared the LC 520 with an LC II, an LC III, a IIsi, and a IIci using our standard test suite. These tests measure several aspects of a computer's performance: the system's raw computation strength, the Mac's math processing ability for specialized applications, the Mac's speed in shuttling data to drives, and its speed in displaying images and menus on screen. The tests are designed to reflect real-world usage.

The preproduction version of the LC 520 that we tested was configured with the LC 520's standard 5MB of RAM and 512K of VRAM. The other Macs tested were configured with 4MB of RAM. We used a Quantum-based 230MB hard drive from APS, whose speed ensures that our tests accurately measure the Mac bus's performance, not the drive's. We used the standard Apple 14-inch monitor.—**Macworld Lab testing supervised by Mark Hurlow**

The LC 520's case is the most complex piece of plastic Apple has yet molded, representing a large investment in tooling. Somewhere in Cupertino, I suspect, there's a spreadsheet that says that Apple will need to sell more than a million of these systems to be happy about this design. Whether all these units can be absorbed by the educational market remains to be seen. That's another reason to expect to see an LC 520 at a store near you one day.

Environmentally Sensitive

Like the Color Classic, the LC 520 has power-conservation features that, Apple says, will conform to the U.S. Environmental Protection Agency's Energy Star guidelines for power usage, which are designed to reduce the power consumed by computers and peripherals. (At press time, the LC 520's certification of Energy Star compliance was pending.) Apple intends for all of its products to conform to these guidelines eventually.

The LC 520's monitor stops displaying images (going into standby mode) after a user-defined period of inactivity, which cuts the LC 520's energy usage almost in half, to about 30 watts. Standby works like a screen saver, except that a screen saver saves no power because the monitor is still displaying images (even if just a black one). Once in standby mode, the monitor takes a few seconds after a keyboard press or mouse movement to warm up and display images.

Cheaper than a PC

To longtime Macintosh fans, the LC 520 might seem something like an LC III with the standard Mac monitor welded to the top. To the rest of the world, it will be startling, welcome news because it's a first for Apple, because if you add up the value of all the hardware in an LC 520 package, it comes to a bit less than an equivalent DOS PC—a first for Apple.

Even in the world of heavily discounted PCs, an Intel 486SX-based PC running at 25MHz (a fair comparison) with the same RAM and hard drive, a Sony double-speed CD-ROM drive, and a 14-inch Trinitron monitor (which is better than what most PC vendors offer) costs more than Apple's suggested price for the LC 520: the PC package would come to $1650 (assuming a 20 percent educational discount) versus the LC 520's $1600. This is revolutionary for a company that flourished on its ability to sell a monochrome computer with a 9-inch screen (keyboard not included) at two to three times the price of a color PC. Apple is demonstrating that it can compete head to head on features and price with anyone, at least in multimedia-capable computers.

So the LC 520 represents a great value for the school systems of North America and for consumers in Japan. It could also represent a source of frustration for people who already bought an LC III or IIvx—it amounts to an LC III with a free CD-ROM drive and a $200 Trinitron monitor, or a half-price CD-equipped IIvx (albeit without the NuBus slots). At a minimum, the LC 520 indicates that Apple can now turn out Macintosh variants at a fraction of the price premium we used to expect. **m**

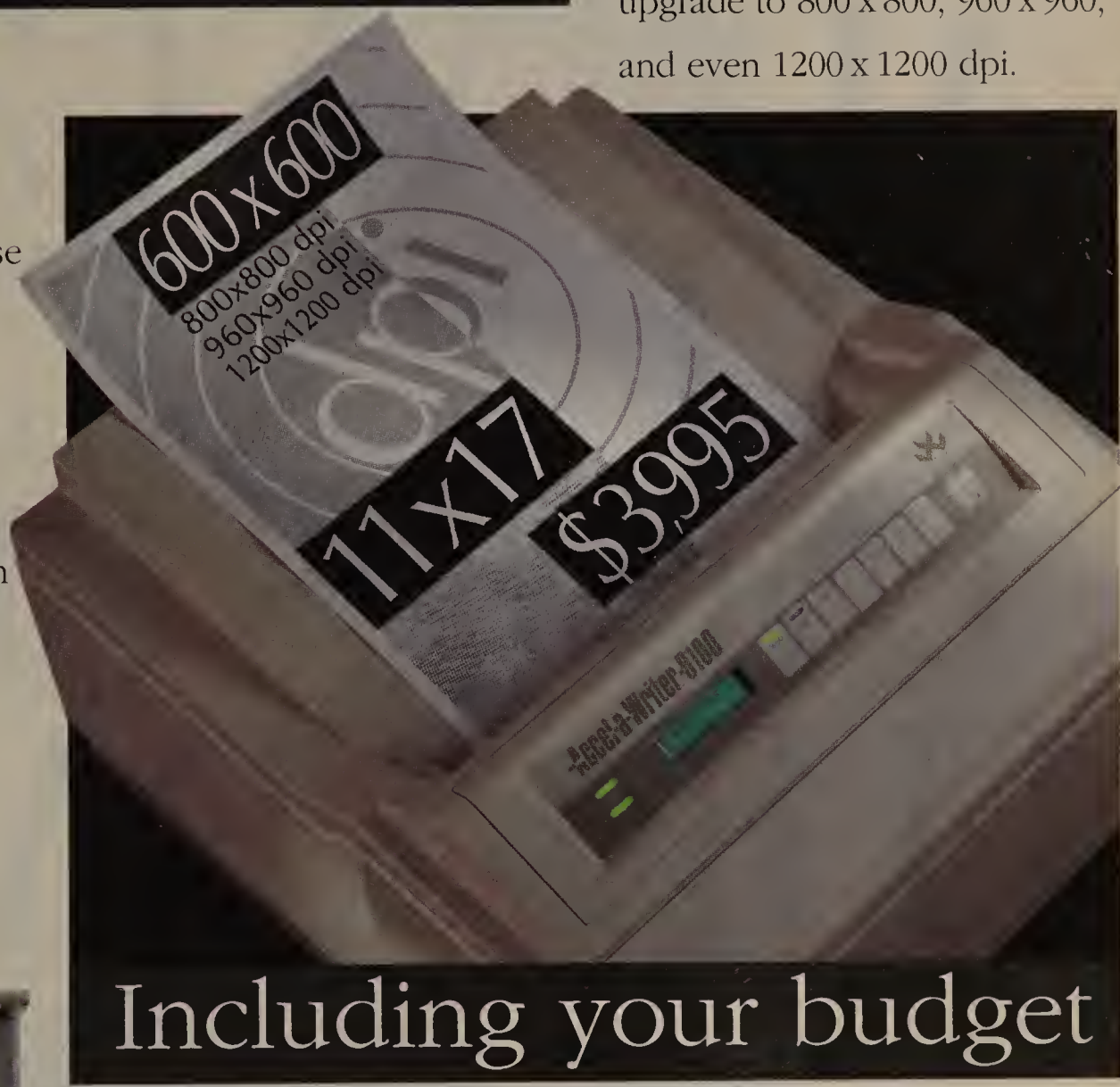
CHARLES SEITER is a *Macworld* contributing editor who usually writes about science and engineering products. He maintains an unquenchable enthusiasm for cheaper Macintoshes.

Certain things should not be compromised

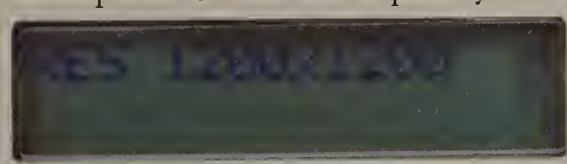
When the printed page is a reflection of your creativity, don't let the printer compromise your work. Xante's Accel-a-Writer 8100 will ensure the printed page is as good as the person behind it.

The Accel-a-Writer 8100 is an 11" x 17", 600 x 600 dpi laser printer that provides full PostScript® compatibility and a level of performance that will improve the quantity of your work as well as the quality.

Supporting 11" x 17" paper is only one of the paper handling benefits. The Accel-a-Writer 8100 comes with two input trays, allowing you to print on different size pages without having to reload the printer. A third tray can be installed to allow for up to 850 sheet capacity.



Including your budget



Xante combines resolution technology and ultra-fine toner to break the 600 dpi barrier and provide unmatched quality. With the Accel-a-Writer 8100, you can upgrade to 800 x 800, 960 x 960, and even 1200 x 1200 dpi.

You may be surprised to find you won't be forced to compromise your budget either. At $3,995, it is the most aggressively priced printer in its class.

Don't compromise your work. Call Xante directly to order your Accel-a-Writer 8100.

	Accel-a-Writer™ 8100	QMS® 860 Print System	NewGen® TurboPS 660 B	CalComp® CCL-600
Standard Resolution (dpi)	600 x 600	600 x 600	600 x 600	600 x 600
Optional Resolution (dpi)	800 x 800, 960 x 960 & 1200 x 1200	None	600 x 1200	None
Standard RAM	12 MB	12 MB	12 MB	4 MB
Virtual Disk Technology	✓ †			
Enhanced Gray Scale	✓			
Price	$3,995	$4,595	$5,495	$3,995

† Optional

Statistics as of 2 93

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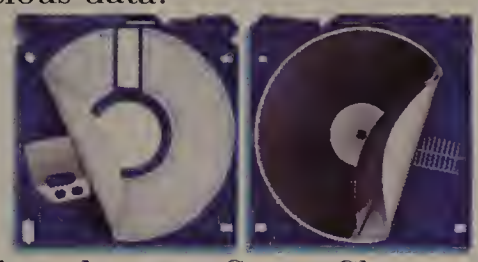
Curiously, some of what's stored on your floppy disks would be better lost than saved. Tiny bits of dirt and debris can enter a disk uninvited, only to threaten your most precious data.

Sony designed its new Super Cleaning Mechanism to better preserve your data. It's a dirty job, but someone had to do it.



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At the heart of this waste management system is a new pressure-balanced metal lifter, providing greater contact between the disk liner and magnetic surface, to make debris pick-up routine.

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For the finishing touch, Sony's Super Cleaning Mechanism™ uses rows of very fine cross-flow ribs, molded into the disk's shell, to trap invading particles before they can turn into messy problems.

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MW LAB Macworld Lab tests 20 monochrome ink-jet and laser printers under $2000

by Jim Heid

You enter the local CompuSuperStore on a mission to finally replace that whining ImageWriter with a printer that makes less noise and sharper copy. You cringe at the thought of how much money you'll need to spend, but a pleasant surprise greets you: several brand-new machines from Apple, Digital Equipment Corporation, GCC Technologies, and Texas Instruments retail for less than $1000—some even include PostScript. Several portable printers would go perfectly with a PowerBook. And some surprisingly powerful machines provide enhanced resolution or print up to 12 pages per minute, and connect to various networks. Printers like these used to cost $5000 and up—now they go for less than $2000.

Maybe you'll escape with something other than family photos in your wallet after all. To help you toward that goal, Macworld Lab tested 20 monochrome (black-and-white) printers ranging in price from $359 to $1999 (see the tables, "Surveying Ink-Jet and Thermal-Transfer Printers" and "Surveying Laser Printers"). "Answers to Printer Questions" can serve

PHOTOGRAPHS BY LUIS DELGADO

The top picks in this year's personal printer roundup (clockwise from left): the Apple LaserWriter Select 300, the best QuickDraw printer; the Apple StyleWriter II, the best ink-jet; and the Texas Instruments microLaser Turbo, the best PostScript offering.

as a crib sheet for your shopping trip. Suitably prepared, you can begin surveying the shelves.

The Ink-Jet Bargain Basement

You start in the ink-jet department, where prices start at under $400. You've browsed here before, and found a typical bargain basement—bare fluorescent lights, exposed heating ducts, and printers that are slow, finicky about paper, and produce splotchy copy that smears when it gets wet.

But the department looks better this time. Ink-jet printers still have the same disadvantages, but the latest versions of their driver software produce better results with gray-scale scanned images.

Take the Apple StyleWriter II ($359), which uses a compact (6.6-pound) Canon-built mechanism that prints 360 dots per inch. The StyleWriter II's driver enables the printer to render scanned images better than some laser printers (see "Comparing Print Quality"). The driver also lets you share the printer on a LocalTalk network—just click on the Setup button in the Chooser and then check the Share This Printer box. (Apple calls this combination and improved gray-scale technology *GrayShare*.) You can even give the printer a password that other users must type before they are able to access it. (One catch is that your Mac slows down when it processes other users' jobs.)

The Hewlett-Packard DeskWriter ($399) can be shared on a network without slowing down the Mac it's attached to. The bulky, 300-dpi DeskWriter is aging but still spry. Overall, the DeskWriter was faster than the StyleWriter II, although the latter printed font test documents faster (see "Personal Printers Face Off"). The latest DeskWriter driver improves the printer's gray-scale output. HP has added options for *dithering*—the process of combining dots in patterns that simulate gray shades. The DeskWriter's results aren't as good as the StyleWriter II's, however. For good grays on a bad budget, the StyleWriter II is the ink-jet printer to buy.

Printers for Portables

Over in the portables department, things are heating up as printer vendors try to leverage off the success of Apple's PowerBook line. On this shelf—move closer to see it—is the GCC Technologies WriteMove II ($599). Cut a box of alumnimum foil in half vertically for a rough idea of how small this 2.5-pound puppy is. A sock would make a nice carrying case. The WriteMove II runs on a rechargeable battery and includes a cleverly designed AC adapter whose prongs fold down so as not to puncture your briefcase.

This printer isn't an ink-jet—it uses a 360-dpi thermal-wax transfer mechanism built by Citizen. The thermal-wax output doesn't smear when wet, and large black areas don't mottle as they do with liquid ink. The WriteMove II's ink ribbon is only a bit larger than a microcassette tape. The printer supports a multistrike ribbon that you can use until it's threadbare, or a single-strike film ribbon that produces dark, crisp output. Do stock up, though—the WriteMove II gets only 20 pages from the single-strike ribbon. But WriteMove II ribbons cost only $5 each.

The WriteMove II lacks a sheet feeder—you have to hand-feed each page, and properly aligning the top of the page can be tricky. Because of this, we didn't run lab tests on the WriteMove II. In some informal speed tests with single-page documents, the WriteMove II was only slightly faster than the Eastman Kodak Diconix 701—the slowest printer tested this time around. But there's nothing smaller than the WriteMove II—and its film-ribbon output is superb.

And what's this with the "New!" banner above it? It's the Apple Portable StyleWriter ($449), a slightly repackaged version of a battery-powered Canon ink-jet, the BJC-10sx. At an almost portly 4.5 pounds, the Portable StyleWriter is nearly twice as heavy as the WriteMove II, but it gets a few hundred pages from a single ink cartridge. The sheet feeder you'll want for multipage jobs is a $69 option.

In Macworld Lab's tests, the Portable StyleWriter finished second to last—overall about half the speed of the Style-

ANSWERS TO PRINTER QUESTIONS

When you're shopping for a printer, you'll probably have to endure some questions from the dealer or from a mail-order house's representative. Here's some background to prepare you for the grilling.

Were you looking for an ink-jet or a laser printer? With prices starting at $359, ink-jet printers go for about half the cost of a cut-rate laser, and they take up less space. The latest machines—especially Apple's StyleWriter II—produce results that are difficult to distinguish from laser ouput. (Tip: You can make the output look even better—and eliminate the risk of smearing—by photocopying it.) On the downside, ink-jets are slow and lack the paper-handling features most lasers provide. And no PostScript monochrome ink-jets are available.

Do you need PostScript? PostScript, a language designed to describe the appearance of pages, is essential if you'll be creating artwork in Adobe Illustrator or Aldus FreeHand, or creating publications that will be printed by a service bureau. You can also use a PostScript printer with non-Mac PCs, and nearly all PostScript printers include built-in network connectors.

Do you want PostScript Level 2? PostScript Level 2 is a newer version of the language and provides numerous enhancements, many of which have to do with color printing. Still, a few Level 2 improvements—the ability to store, or cache, elements that repeat on each page and the ability to accept images in compressed form—have the potential to improve any PostScript printer's performance. If price and other features are equal, choose a Level 2 printer over a Level 1 one.

Interested in a clone? PostScript-clone printers contain interpreters created by firms other than Adobe Systems. Early clones were plagued with problems, and bugs still surface now and then. All in all, though, today's clones are reliable.

Will you print a lot of TrueType fonts? If you're buying a QuickDraw printer, this question isn't relevant, since all QuickDraw printers support (if not require) TrueType fonts. But if you're buying PostScript and you want to print TrueType fonts—perhaps because you use TrueType fonts on a DOS PC or because your favorite font isn't available in PostScript form—look for a printer that contains the TrueType *rasterizer*, which is the software that translates font outlines into the dots that go on the page. You can print TrueType fonts on a printer that lacks the rasterizer, but they'll take longer to print than PostScript fonts. If you buy a bargain-priced PostScript printer, you may have to add to the printer's memory to print multiple TrueType fonts on a page.

Do you want high-res output? Several printers incorporate resolution-enhancement technologies that result in smoother text and, in some cases, better-looking scanned images. Other companies use print engines that provide higher resolution—say, 600 dpi instead of 300. A printer that produces more dots per inch is likely to cost more, since it requires more internal memory.

Writer II. The Portable StyleWriter nicely matches the look-and-feel of a PowerBook, but if you can do without battery operation, you'll get much better performance and gray-scale output from the StyleWriter II.

Gathering dust on the bottom shelf is the Eastman Kodak Diconix 701 ($479), a battery-powered ink-jet portable. The book-size Diconix 701 has one edge over the WriteMove II and Portable StyleWriter—it includes a sheet feeder that holds up to 30 sheets of paper. Otherwise, it's unimpressive. The printer is designed to connect to IBM PCs—only by using a bulky adapter can it be coerced into talking to Macs. You'd be better off using a PC-oriented portable printer such as Canon's BJ-10ex along with a driver-and-cable package such as GDT Softworks' PowerPrint (see "Maximize Your Printer," in this issue). In fact, that's about what Kodak has done with this printer—its driver was written by GDT.

On the way to the laser printer section, you pass through the big-and-wide department, which has just one offering—the GCC Technologies WideWriter 360 ($1699)—a 360-dpi, Canon-based ink-jet capable of printing sheets up to 17 by 22 inches. The WideWriter doesn't use PostScript, but includes a driver and outline-font package similar to those of GCC's WriteMove II and PLP II personal laser.

The WideWriter also works with ColorAge's PostScript emulator, Freedom of Press Classic (also covered in "Maximize Your Printer," in this issue). The WideWriter is a low-cost alternative to a large-format laser printer, ideal for proofing tabloid-size publications, for drafting and design applications, and for printing signs and banners.

The GCC Technologies PLP II was the fastest QuickDraw printer tested for this article.

Lasers for Less

Although the ink-jets may have sparked your interest, you owe it to yourself to examine the rest of the dealer's offerings. Besides, laser printer prices have gone from five figures in the seventies to four figures in the eighties to three figures in the nineties. In another ten years, *Time* might give you one just for subscribing.

Until then, there are bargain-priced machines such as the Apple LaserWriter Select 300 ($839). Its name smacks of a low-cal frozen dinner, but Apple's new offering is a winner. It uses Apple's FinePrint resolution-enhancement technology to create tack-sharp text, and if you upgrade its memory to 5MB, it supports Apple's PhotoGrade technology to produce the best gray-scale output for less than $1000. There isn't a better non-PostScript printer for producing newslet-

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Personal Printers Face Off

Fastest result in each category for each test. Times are in seconds. Shorter bars are better. Products are listed in order of overall performance for each category, from fastest to slowest.

	Multiple Fonts	Single Font	MacDraw Pro	FreeHand 3.1	PageMaker 4.2	TrueType
	Print speed for a 7-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.	Print speed for a 20-page Word 5.0 document containing double-spaced, 12-point Courier text in plain, bold, and italic.	Print speed for a graphic containing more than 2000 simple objects and several lines of Helvetica text.	Print speed for a complex graphic that includes special PostScript effects, nonlinear blends, and Bézier curves.	Print speed for a 4-page newsletter using several fonts, a MacPaint image, and 3 gray-scale TIFF images.	Print speed for a 1-page Word 5.0 document containing 4 TrueType fonts.
PostScript Printers						
TI microLaser Turbo [A]	156	168	176	424	92	84
TI microLaser Turbo [B]	150	160	169	424	96	93
Apple Personal LaserWriter NTR	286	319	214	546	188	134
NewGen TurboPS/300p	332	514	274	566	152	120
QMS PS-410[C]	263	332	285	777	182	187
NewGen TurboPS/400p	351	542	314	689	162	126
OkiData OL850 [A]	436	167	373	1817	130	242
QMS PS-410 [D]	265	326	314	774	185	252
GCC Technologies BLP Elite	396	306	301	1339	184	221
TI microLaser Plus PS17	474	200	360	1730	190	252
TI microWriter PS23	480	274	316	1466	184	236
NEC SilentWriter Model 95F [E]	456	234	434	1416	182	236
DEC DEClaser 1152 [A]	485	338	406	1264	258	204
Apple LaserWriter Select 310 [F]	360	266	343	1513	1679	208
QuickDraw Printers						
GCC Technologies PLP II	197	406	82	831	531	75
Hewlett-Packard DeskWriter	334	497	98	234	647	69
Apple LaserWriter Select 300	220	412	187	1015	271	87
Apple Personal LaserWriter 300	184	370	202	1046	348	98
Apple StyleWriter II	246	397	172	1531	484	71
Apple Portable StyleWriter	675	1755	325	622	726	119
Eastman Kodak Diconix 701	990	2880	271	495	1005	159

Tests were conducted on a Macintosh IIci, with a cache card installed, 8MB of RAM, and an internal Quantum 80MB drive.

[A] Unlimited downloadable fonts option selected for TrueType document. [B] With optional 1MB of RAM installed. [C] 6MB version. [D] 2MB version. [E] With optional 2MB of RAM installed. [F] With PageMaker 4.2 instead of version 4.2a, PageMaker test took 384 seconds.

ters and other publications containing scanned images. The Select 300 connects to the Mac's modem or printer port but can also be shared on a network through the GrayShare scheme described earlier.

The LaserWriter Select line uses a 5-ppm Fuji-Xerox engine that uses a Canon-like slide-in toner and drum cartridge. The Select 300 includes a 250-sheet paper tray and accepts a wider variety of paper-handling options than most printers in its price range. A second 250-sheet feeder costs $149, a 500-sheet feeder is $299, and a 30-envelope feeder is $89.

Then there's the new Apple Personal LaserWriter 300 (see *News*, August 1993). Tipping the scales at only 15 pounds, this may be the lightest laser around—it weighs less than Apple's original Mac Portable. But it isn't a lightweight. The Personal LaserWriter 300 supports GrayShare. It uses a new 4-ppm Canon engine that sports an energy-saving power-down feature. The printer is always on—there is no power switch—but until the Mac tells the Personal LaserWriter 300 to print a job, it keeps itself in an idle state that uses less than 5 watts of power. (Several other printers, including Okidata's OL850, GCC's PLP II, and Lexmark's IBM LaserPrinter 4039 family, offer similar energy-saving modes. By the time this appears, vendors whose printers meet the Environmental Protection Agency's Energy Star conservation guidelines will be eligible to display the Energy Star symbol in their advertising.)

The Personal LaserWriter 300 was faster than the LaserWriter Select 300 in our font and Courier tests, and the two printers performed similarly in the remaining tests. The Personal LaserWriter 300's paper-handling options don't measure up to the LaserWriter Select 300's—no second tray is offered—but this probably isn't a drawback for the home and small-office market for which this printer is designed. If you disagree, consider the LaserWriter Select 300 instead. The Personal LaserWriter 300's price was not finalized at press time, but is expected to be approximately $700.

Then there's the venerable GCC Technologies PLP II ($659), the latest version of the first personal laser printer—GCC's Personal LaserPrinter, which debuted in 1987. The PLP II uses a compact 4-ppm engine whose paper tray holds 250 sheets of paper. Changing toner cassettes for this Okidata-built engine is potentially messier than for the Apple printers, which use a disposable toner cartridge–and–drum assembly. But the PLP II's toner cassettes cost only $33—about a third the cost of most other printers' cassettes. After 15,000 pages, you'll have to snap in an imaging drum at a cost of $289. Still, the PLP II is one of the least expensive personal laser printers to operate.

The PLP II is the only currently shipping personal laser that connects via the Mac's SCSI port, which can transfer data more quickly than the serial or LocalTalk connectors other printers use. This helps make the PLP II faster than its competitors, but there are drawbacks. Setting up a chain of SCSI devices can be tricky,

Surveying Laser Printers

	Apple Computer	Apple Computer	Apple Computer	Apple Computer	Digital Equipment Corporation	GCC Technologies
Product	Personal LaserWriter NTR	Personal LaserWriter 300	LaserWriter Select 300	LaserWriter Select 310	DEClaser 1152	PLP II
Phone	408/996-1010	408/996-1010	408/996-1010	408/996-1010	508/493-5111	617/275-5800
Toll-free phone	○	○	○	○	800/344-4825	800/422-7777
List price	$1179	$689	$839	$1079	$999	$659
Tested by Macworld Lab	●	○	●	●	●	●
Imaging language	Adobe PS Level 2	QuickDraw	QuickDraw	Adobe PS Level 1	Adobe PS Level 2	QuickDraw
Processor/clock rate	AMD 29000 RISC/ 16MHz	NA	NA	AMD 29205 RISC/ 16MHz	68000/16MHz	NA
Number of fonts provided	64	39	39	13	17	21
TrueType rasterizer built in	●	NA	NA	○	○	○
RAM (base model/maximum)	3MB/4MB	512K/512K	512K/5MB	1.5MB/5.5MB	2MB/4MB	1MB/1MB
Uses standard SIMMs for RAM upgrade	●	NA	●	●	●	●
SCSI port for font hard disk	○	○	○	○	○	○
Other controller upgrades	○	○	PostScript ($399)	○	○	PostScript
Additional software included	○	○	○	○	○	○
Print engine/maximum speed (in pages per minute)	Canon LX/4	Canon/4	Fuji-Xerox/5	Fuji-Xerox/5	Canon LX/4	Oki OL-400/4
Resolution (in dots per inch)/ resolution enhancement	300 × 300/○	300 × 300/●	300 × 300/●	300 × 300/○	300 × 300/●	300 × 300/○
Paper capacity (first tray/second tray; in sheets)	70/250 optional	100/○	250/500, 30 envelopes optional	250/500, 30 envelopes optional	70/250	250/200
Paper sizes supported	letter, legal, A4 executive, envelopes	letter, legal, A4, executive, envelopes	letter, legal, A4, executive, envelopes	letter, legal, A4, executive, envelopes	letter, legal, A4, executive, envelopes	letter, legal, A4, B5
Recycling program for consumables	●	●	○	○	●	○[6]
Warranty period (in years)	1	1	1	1	1	1
Technical-support rating	not rated[7]	not rated[7]	not rated[7]	not rated[7]	poor	excellent

● = yes; ○ = no. Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessiblility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests.

[1] An 8-ppm version is available for $1349.

especially when one of the devices—the PLP II—has just one SCSI port, not the usual two.

Still, the PLP II has a lot going for it. If you use System 7, you can share the PLP II on a network. Unlike almost any other laser, it can print to the left and right edges of the page (output quality deteriorates a bit at the edges). For $399, you can upgrade the PLP II to a PostScript-based BLP Elite. The PLP II uses GCC's time-tested driver, the latest version of which includes improved dithering routines that produce better results with scanned images. And GCC was conserving energy long before the EPA made it fashionable—the PLP II has always had a standby mode that kicks in automatically after a few minutes of rest. And it has a power switch.

PostScript for Peanuts

Moving into the PostScript department, déjà vu hits as you see a printer that looks just like a LaserWriter Select 300. You have spied the Select 300's evil twin, the LaserWriter Select 310 ($1079). The Select 310 provides PostScript, but with too many compromises. It cannot be shared on a Macintosh network (DOS PC users can attach a third-party printer-sharing box to its parallel port), it includes only 13 fonts (the Select 300 comes with 39), and it can't print a complex legal-size page (one containing graphics and a variety of fonts) without a memory upgrade. The 310 was the slowest PostScript printer we tested, and it supports neither FinePrint nor PhotoGrade. (If you have a LaserWriter Select 300 you'd like to slow down, Apple sells a 300-to-310 "upgrade" for $349.)

For cheap PostScript, a much better choice is the Texas Instruments microWriter PS23 ($999). This 5-ppm printer includes just 23 fonts (a 35-font model costs $1299), but TI throws in much of what Apple threw out: a LocalTalk network port, enough memory to print a legal-size page, even HP LaserJet emulation with automatic emulation switching. Its overall performance is much better

Comparing Print Quality

LAZY DOG'S AZ

Good: The Texas Instruments microWriter PS23

LAZY DOG'S AZ

Better: The Apple LaserWriter Select 300

LAZY DOG'S AZ

Best: The NewGen Turbo PS/400p.

If you just want clean text for office memos, just about any laser printer will do the job. For small type, these laser printers show nearly identical quality. In enlarged type, differences emerge. Notice the serifs on the large *Z*—nearly perfect on the 400-dpi Turbo PS/400p, but substantially distorted by the microWriter. Each *AZ* letter pair shown above is a 400 percent enlargement of the smaller type.

GCC Technologies	GCC Technologies	Lexmark	Lexmark	NEC	NewGen Systems Corporation	NewGen Systems Corporation	Okidata
BLP Elite[1]	BLP Eclipse[2]	LaserPrinter 4039-10R	LaserPrinter 4039-12R	SilentWriter Model 95F	TurboPS/300p[2]	TurboPS/400p[3]	OL850
617/275-5800	617/275-5800	606/232-2000	606/232-2000	508/264-8000	714/641-8600	714/641-8600	609/235-2600
800/422-7777	800/422-7777	800/358-5835	800/358-5835	800/388-8888	800/756-0556	800/756-0556	800/654-3282
$879	$1099	$1599	$1999	[4]	$1595	$1995	$1999
●	○	○	○	●	●	●	●
Adobe PS Level 1	Clone PS Level 2	Clone PS Level 1	Clone PS Level 1	Adobe PS Level 2	Clone PS Level 1	Clone PS Level 1	Adobe PS Level 1
68000/16.67MHz	AMD 29200/16MHz	AMD 29200/16MHz	AMD 29200/16MHz	68000/16.7MHz	Weitek 8220 RISC/ 16MHz	Weitek 8220 RISC/ 16MHz	68000/12.5MHz
17	17	39	39	35	35	35	65
○	●	○	○	○	●	●	○
2MB/4MB	2MB/6MB	2MB/16MB	4MB/16MB	2MB/5MB	3MB/16MB	4MB/16MB	2MB/6MB
○	○	●	●	○	○	○	○
○	○	○	○	○	optional	optional	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	Adobe Type Manager
Oki OL-400/4	Oki OL-400/4	Lexmark/10	Lexmark/12	Minolta/6	Canon LX/4	Canon LX/4	Oki OL-800/8
300 × 300/○	300 × 300/○	600 × 600/●	600 × 600/●	300 × 300/●	300 × 300/optional	400 × 400/●	300 × 300/●
250/[5]	250/[5]	200/600 optional	200/600 optional	250/250 optional	70/250 optional	70/250 optional	200/200 optional
letter, legal, A4, B5	letter, legal, A4, B5	letter, legal, A4, B5, envelopes	letter, legal, A4, B5, envelopes	letter, legal, A4, A3	letter, legal, A4	letter, legal, A4	letter, legal, A4, executive
○[6]	○[6]	●	●	○	○	○	○
1	1	1	1	1	1	1	1 all other parts/ 5 engine
excellent	excellent	not rated	not rated	satisfactory	excellent	excellent	poor

[2] *The 8-ppm version, $1799, also includes resolution enhancement.*

[3] *The TurboPS/660p, with a faster controller and 600 × 600–dpi resolution, also sells for $1995.*

[4] *No list price; check with dealer.*

[5] *Company did not supply information.*

[6] *The PLP and BLP series have an internal toner recycling feature.*

[7] *Dealer support only.*

than the Select 310's, and the microWriter offers a similar array of paper-handling options.

TI's Texas-size family of affordable PostScript printers also includes the 9-ppm microLaser Plus PS17 ($1199) and a 35-font, $1349 cousin, the microLaser Plus PS35. (Barristers beware: you'll need to upgrade to at least 2MB of RAM to print legal-size pages.) You can upgrade either of these machines to a high-speed microLaser Turbo, which we will examine shortly.

But first, what's this? A Digital Equipment Corporation (DEC) printer in the econolaser department? The 4-ppm, 17-font DEClaser 1152 ($999) is the least expensive machine reviewed here that supports PostScript Level 2, the latest and greatest version of the PostScript language. It's also a snail that oozed across the finish line just ahead of the LaserWriter Select 310. The DEClaser 1152 contains a PhotoGrade-like image-enhancement feature, but it makes a slow printer even slower, and you have to download a PostScript program to the printer to enable or disable the feature. Next!

This is more like it—the GCC BLP Elite ($879), which uses the same Okidata engine as the PLP II series. The 17-font BLP Elite has the LocalTalk port and 2MB of memory that Apple stripped out of its LaserWriter Select 310. It's much faster, too—the BLP Elite trounced the LaserWriter Select 310 and just edged out TI's microWriter. (We tested the 4-ppm BLP Elite; an 8-ppm version is available for $1349.)

Going Upscale

At the end of the aisle, you turn the corner, and the surroundings change. You've gone upscale—into the province of printers that provide faster performance, better print quality, or more options.

Your heart rate increases a bit—for good reasons. Many of the printers here outperform machines that cost thousands more a couple of years ago. The real star is the TI microLaser Turbo ($1599), which was the fastest PostScript printer we tested. The Turbo uses the same compact, Sharp-built engine as the PS17 and PS35 models but replaces their 68000-based PostScript Level 1 controllers with a RISC-based PostScript Level 2 brain. It's fast enough to serve a small workgroup; a high-speed Ethernet network interface is optional.

Another fast PostScript machine is the Apple Personal LaserWriter NTR ($1179), whose RISC-based Level 2 controller pushed the 4-ppm printer to a distant second-place finishing behind the TI microLaser Turbo. The NTR is a few years old, but it's still a solid performer. Paper handling is only fair, though—the printer holds just 70 sheets. A 250-sheet paper tray and the required base for it cost $164.

A 200-sheet paper capacity is standard in the Okidata OL850 ($1999), whose engine is similar to that of GCC's printers. (A second 200-sheet tray is optional.) Its 8-ppm engine allowed the OL850 to finish near the top in the Courier document test, but its overall performance was mediocre. The OL850 also provides HP LaserJet emulation and is among the few printers reviewed here that provide a resolution-enhancement feature that

Surveying Laser Printers (continued)

	QMS	QMS	Samsung Electronics America	Texas Instruments	Texas Instruments	Texas Instruments
Product	PS-410	420 Print System	Finalé 8000	microLaser Plus PS17 [8]	microWriter PS23	microLaser Turbo
Phone	205/633-4300	205/633-4300	201/229-4000	○	○	○
Toll-free phone	800/631-2692	800/631-2692	200/466-0262	800/527-3500	800/527-3500	800/527-3500
List price	$1595	$1995	$1995	$1199	$999	$1599
Tested by Macworld Lab	●	○	○	●	●	●
Imaging language	Adobe PS Level 1	Clone PS Level 2	Adobe PS Level 1	Adobe PS Level 1	Adobe PS Level 1	Adobe PS Level 2
Processor/clock rate	68020/16MHz	68020/20MHz	Intel i960/16MHz	68000/16MHz	68000/16MHz	Weitek 8220 RISC/ 16MHz
Number of fonts provided	45	39	35	17	23	35
TrueType rasterizer built in	○	○	●	○	○	○
RAM (base model/maximum)	2MB/6MB	6MB/10MB	2MB/18MB	.5MB/4.5MB	2MB/4.5MB	2.5MB/10.5MB
Uses standard SIMMs for RAM upgrade	○	●	○	○	○	○
SCSI port for font hard disk	○	○	○	○	○	○
Other controller upgrades	○	○	1200 dpi $995	[9]	[9]	[9]
Additional software included	○	○	○	○	○	○
Print engine/maximum speed (in pages per minute)	Canon LX/4	Canon LX/4	Samsung/8	Sharp/9	Samsung/5	Sharp/9
Resolution (in dots per inch)/ resolution enhancement	300 × 300/○	600 × 600/○	300 × 300/○	300 × 300/○	300 × 300/○	300 × 300/○
Paper capacity (first tray/second tray; in sheets)	70/250 optional	70/250 optional	250/250	250/500 optional	250/500 optional	250/500 optional
Paper sizes supported	letter, legal, executive, A4, B5	letter, legal, executive, A4, B5	letter, legal, executive, A4	letter, legal, A4, B5, envelopes, invoice	letter, legal, A4, B5, envelopes	letter, legal, A4, B5, executive
Recycling program for consumables	●	●	○	○	○	○
Warranty period (in years)	1	1	2	1	1	1
Technical-support rating	very good	very good	not rated	satisfactory	satisfactory	satisfactory

● = yes; ○ = no. Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessiblility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests. [8] microLaser Plus PS35, with 35 fonts, sells for $1349. [9] Company did not supply information.

improves text output.

The OL850's text smoothing does a good job, but it falls short of the NewGen Systems TurboPS/400p ($1995), which uses a 400-dpi Canon engine. The extra resolution not only helps text, but results in better gray-scale output, too.

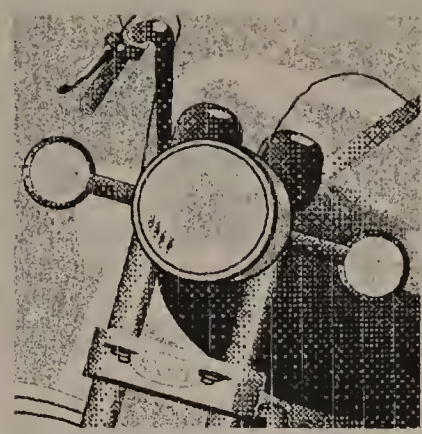
The printer's RISC-based controller and PostScript-clone interpreter helped it finish fifth, slightly behind the NewGen TurboPS/300p ($1595), a 300-dpi version of the TurboPS/400p.

Finally, there's the NEC SilentWriter Model 95F. This printer has some fine attributes, starting with PostScript Level 2 and resolution enhancement. It's also the only printer reviewed here that accepts an optional board that turns it into a plain-paper fax. (Compaq sells some fax-capable printers, but their prices begin at $2729.)

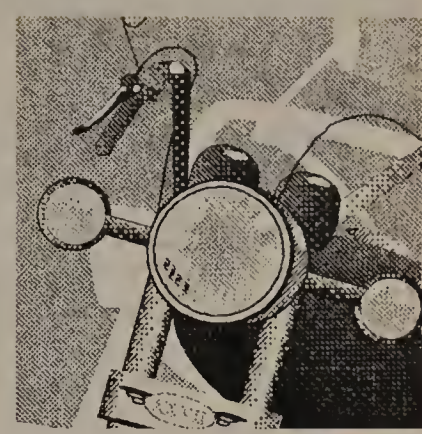
Unfortunately, the SilentWriter Model 95F finished near the bottom of the pack in our speed tests, just ahead of the DEClaser 1152 and virtually tied with TI's microWriter. Still, if you don't need sizzling performance and you do want PostScript fax capabilities, the Model 95F deserves a look.

Graphics Difference

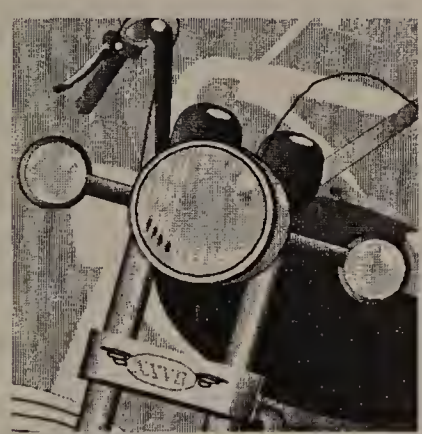
Apple StyleWriter II



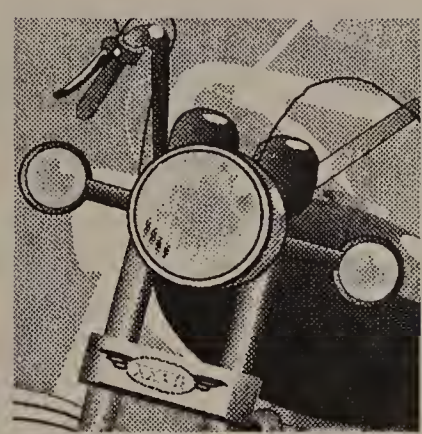
HP DeskWriter



GCC PLP II



Apple LaserWriter Select 300



TI microWriter PS23

This PostScript graphic shows diverse gray-scale abilities. The QuickDraw-based LaserWriter Select 300 (bottom, left) uses PhotoGrade to create more smoothly changing grays in the bars beneath the headlight than an average PostScript laser, the microWriter PS23 (bottom, right). The StyleWriter II, a 360-dpi ink-jet (top, left), produced far better grays than HP's DeskWriter (top, middle) or even GCC's PLP II, a 300-dpi QuickDraw laser (top, right).

Attractive Newcomers

As you stand amid this sea of scribes, trying to sort them out and pick the winners, the salesperson begins telling you about still more printers that are just around the corner (and that went on sale after Macworld Lab testing was completed). One of these is the $1995 Samsung Electronics America Finalé 8000, an 8-ppm workhorse that includes two 250-sheet trays and a RISC-based PostScript Level 1 controller. An additional

Surveying Ink-Jet and Thermal-Transfer Printers

	INK-JET					THERMAL-TRANSFER	
	Apple Computer	Apple Computer	GCC Technologies	Eastman Kodak	Hewlett-Packard	GCC Technologies	Mannesmann Tally
Product	Portable StyleWriter	StyleWriter II	WideWriter 360	Kodak Diconix 701	DeskWriter	WriteMove II	MobileWriterPS
Phone	408/996-1010	408/996-1010	617/275-5800	716/724-4000	○	617/275-5800	206/251-5500
Toll-free phone	○	○	800/422-7777	800/344-0006	800/752-0900	800/422-7777	800/843-1347
List price	$449	$359	$1699	$479	$399	$599	$999
Tested by Macworld Lab	●	●	○	●	●	●	○
Maximum speed (in pages per minute)	1	2	4	3	3	NA [1]	6
Resolution (in dots per inch)	360	360	360	300	300	360	300
Paper capacity (in sheets)	1 (100-sheet tray optional)	100	75	30	100	1	80
Number of fonts included	0	39	21	4	4	0	35
Warranty period (in years)	1	1	1	3	3	1	1
Technical-support rating	not rated [2]	not rated [2]	not rated	good	very good	excellent	not rated

● = yes; ○ = no. Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests.

[1] *No sheet feeder available.*

[2] *Dealer support only.*

BEHIND OUR TESTS

MW LAB Macworld Lab used several real-world documents designed to show printer speed and, to a lesser extent, the computer's ability to handle various printing tasks. For example, the 20-page single-font test document demonstrated the engine speed of the printer, while the Aldus FreeHand document depended heavily on the speed of the printer's or the Mac's processor. A Quadra or Centris would obtain significantly better results than those shown on our test machine—a cache card–equipped Macintosh IIci with 8MB of memory and an internal 80MB drive.

Other test documents included a complex MacDraw Pro illustration to evaluate the printer's ability to handle a QuickDraw document, a four-font TrueType test, a PageMaker file to test the printer's ability to combine gray-scale graphics and text in a single document, and a multiple-font document to test the printer's ability in handling printer-resident fonts.

System 7.1 and LaserWriter version 7.1.1 were used for the PostScript printers unless the printer shipped with a proprietary driver. For non-PostScript printers, we used the drivers that shipped with the printers. Background printing and spooling were turned off.

To assess print quality, we examined the output with the unaided eye as well as with an 8× magnifying loupe. We checked how well each machine printed solid areas and we looked for jagged character edges in large sizes, filled-in characters in small sizes, and differences in gray-scale capabilities.

We also compared the output of PostScript Type 1 fonts from the clone printers and the genuine Adobe machines. And for laser printers we looked for subtle output problems such as *banding*, often caused by friction in the print engine's gears; and *scatter*, a haze of stray toner particles around character edges, caused by stray electrical charges on the printer's photoconductive drum.

—Macworld Lab testing supervised by Mark Hurlow

$995 buys the Image1200 upgrade board, which boosts the printer's resolution to 1200 dpi.

Lexmark shipped several appealing new printers just as this article was going to press. Two members of Lexmark's IBM LaserPrinter 4039 family sell for less than $2000—the 10-ppm LaserPrinter 4039-10R ($1599) and the 12-ppm LaserPrinter 4039-12R ($1999). (A $2199 version of the 10R supports duplex printing—the ability to print on both sides of a page. There isn't a cheaper duplex machine on the market.) The entire 4039 family produces 600-dpi output and offers text and gray-scale resolution enhancement. The 4039 printers also provide energy-saving automatic power-down features.

Other new offerings that were released at press time are GCC's BLP Eclipse line—PostScript Level 2 clones. Unlike GCC's other low-end printers, the 8-ppm Eclipse version offers resolution enhancement. The 4-ppm BLP Eclipse retails for $1099; an 8-ppm model retails for $1799 and replaces the 8-ppm BLP Elite. (The 4-ppm BLP Elite we tested remains available.)

Then there's Mannesmann Tally's $999 MobileWriterPS, the world's first battery-powered, portable PostScript printer. Weighing 8 pounds, the 6-ppm, 300-dpi MobileWriterPS uses a Toshiba-built, 300-dpi thermal-transfer mechanism that holds 80 sheets of paper. With its 68000-based controller, however, I would be surprised to see the MobileWriterPS approach that speed on anything but simple text.

Why portable PostScript? If you use PostScript printers at the office and on the road, you will probably have to do less reformatting, when transferring a document between your laptop and desktop machines. And if you travel with PowerBook-toting coworkers, you and your cohorts can share the printer in your hotel room—or even on the plane. If you cannot live without a PostScript printer at the office and if you print the same types of documents on the road, you could probably benefit from portable PostScript.

So which printer accompanies you to the car? Among ink-jets, Apple's StyleWriter II is hard to beat. It makes a great portable printer, too, if you don't need battery operation. If you do, GCC's WriteMove II gets the edge for portability, but Apple's Portable StyleWriter is faster and accepts an optional sheet feeder.

Among low-cost lasers, it's a toss-up between GCC's PLP II and Apple's LaserWriter Select 300. The PLP II costs less, but the LaserWriter Select 300 offers FinePrint and, when equipped with 5MB of memory, PhotoGrade. Both can be upgraded to support PostScript, but GCC's upgrade provides much better performance and network sharing. If you plan to stick with QuickDraw, buy the LaserWriter Select 300. If you anticipate migrating to PostScript, the PLP II might be the better choice.

As for the upscale printers, the TI microLaser Turbo is the hands-down performance winner. For top print quality, the QMS 420 Print System edges out NewGen's TurboPS/400p. The two printers' text output is nearly identical, but the QMS 420's 600-dpi resolution enables it to print finer halftones with a broader range of grays.

After this briefing, your real shopping trip should go as smoothly as our trip through the virtual computer store. **m**

Contributing editor and *Working Smart* columnist JIM HEID has worked with more than 125 laser printers and has written 10 monochrome printer features for *Macworld*.

PERSONAL PRINTERS

MW EDITORS' CHOICE With so many good competitors it wasn't always easy to separate the winners from the also-rans. We looked at speed, print quality, and a range of options to select the top printers in each category.

Ink-Jet

StyleWriter II The StyleWriter II is slower than the HP DeskWriter and not as easy to share, but offers superior output especially when printing gray-scale images. It's also small enough to be considered portable, although it doesn't run on batteries. **Company:** Apple Computer. **List price:** $359.

QuickDraw Laser

LaserWriter Select 300 Again, Apple's offering is slower than the competition (in this case, the GCC PLP II), but its support for FinePrint and PhotoGrade yields superior output. **Company:** Apple Computer. **List price:** $839.

PostScript Laser

microLaser series The winner for the second straight year, the microLaser Plus models are good (and affordable) performers that can be upgraded to the lightning-fast microLaser Turbo, the fastest printer tested in this roundup. **Company:** Texas Instruments. **List price:** $1199–$1599.

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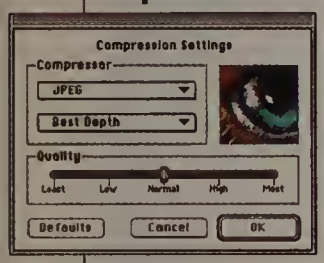

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[1]April 1992, [2]July 1992, *Requires an available NuBus slot
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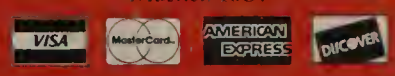

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MW LAB

BY JOSEPH SCHORR

UTILITIES THAT IMPROVE PRINT QUALITY, CONNECT YOU

Maximize your

Whether your Macintosh is connected to a $4000 PostScript laser printer or a $359 StyleWriter II, you can handle print jobs faster, cheaper, and with better results by pairing your printer with the right software. Printer drivers and utilities play a key role in determining how well your printer does its job.

Consider a sampling of the printing sleight-of-hand made possible by add-on printer utilities: endow your QuickDraw printer with the ability to interpret complex PostScript files; make non-networked printers fully networkable; teach low-cost ink-jet printers to do double-sided printing; even plug your Mac into the parallel or serial port of almost any non-Mac PC printer available—and actually print files with great results.

Most of these add-ons fall into four categories: PostScript interpreters, spoolers, print servers, and PC-printer-conversion packages. We've also included other utilities that defy strict categorization; the best of them prod even stodgy, aging QuickDraw printers into doing things you never dreamed possible.

Better Results with PostScript

QuickDraw printers such as Apple's Personal LaserWriter LS, StyleWriter series, and new Personal LaserWriter 300 are generally viewed as poor choices for printing graphics from illustration programs like Aldus FreeHand and Adobe Illustrator. That's because these printers lack an on-board PostScript interpreter to handle the task of turning commands written in Adobe's PostScript page-description language into the tiny rows of dots that make up a printed image. Non-PostScript printers rely on QuickDraw, the language the Mac uses to draw text and graphics on the screen. QuickDraw printers normally turn out PostScript graphics at screen resolution—a somewhat crude 72 dots per inch.

But a QuickDraw printer can create high-resolution PostScript graphics—if paired with a PostScript-compatible *interpreter* (often called a PostScript *clone*) such as Color Age's Freedom of Press Classic (formerly Freedom of Press Light), TeleTypesetting's T-Script (available in Basic, regular, and Deluxe versions), or PM Ware's UltraScript Plus for the Mac (available in a regular version). These software interpreter packages use the Mac's brain to take care of all the complex calculations normally handled by a PostScript printer's interpreter (see "PostScript-Interpreter Options").

How PostScript Clones Work

All three of these PostScript interpreters follow a similar process as they translate PostScript data into information a non-PostScript printer can print.

When you issue the Print command, the programs use the Mac's standard LaserWriter printer driver to create PostScript files from your documents and store them on your hard drive. Your document doesn't go straight to the printer; instead, the interpreter records each element in the document as a series of commands in the PostScript language. The commands describe each page's appearance—from the fonts it uses to the position of each text and graphic element. (T-Script, unlike the other programs, provides a window in which you can view and edit the actual PostScript code before it is printed—though this is not something most users would need to do.)

In the second step, the interpreter software reads the newly created PostScript commands line by line and converts them into a bitmapped graphic image—the kind of image any printer can understand. This conversion process is known as *rasterizing*. When the interpreter has mapped out where each dot of ink will appear on the paper, it sends this information to the printer for output.

Each of these programs can be configured to handle this two-step process seamlessly, if slowly, passing the PostScript files created with the LaserWriter driver directly to the interpreter for printout, provided the Mac has enough available RAM to run the interpreter application in the background. If memory is limited, you must first create the PostScript files, then quit whatever application you were using, launch the interpreter program, and select the PostScript files for printing.

Because these packages interpret text and graphics at the printer's maximum resolution, they can dramatically boost output quality. Consider this: The StyleWriter is equipped to print at an impressive resolution of 360 dpi. But because it is a QuickDraw-based printer, it can only output PostScript graphics at screen resolution, or about 72 dpi—what a waste! These PostScript interpreters unlock the StyleWriter's full resolution potential.

The big question is, How well do these QuickDraw-printer–PostScript-interpreter combinations handle PostScript printing in comparison with true PostScript printers? We tried all three packages in combination with a Hewlett-Packard LaserJet IIIP and found they managed most PostScript jobs satisfactorily—but there was a price to pay in terms of speed and compatibility.

All the interpreter packages handle print jobs much more slowly than do PostScript printers. PostScript printers use their own internal processors to handle PostScript interpretation and rasterizing, while the software-based interpreters perform that processing on the Mac itself. This means major slowdowns when working with a less-powerful Mac.

No single package has the edge on speed. Using a Mac IIci with 8MB of RAM, a cache card, and an internal 80MB hard drive, Freedom of Press handled complex Aldus PageMaker documents slightly faster than UltraScript and nearly twice as fast as the Basic, regular, and Deluxe versions of T-Script—saving more than six minutes over all three versions. On the other hand, UltraScript won easily on graphics applications, ren-

TO NON-MAC PC PRINTERS, AND MORE

printer

dering FreeHand and MacDraw documents in about half the time it took the other packages.

As for PostScript compatibility, no package has it all, we learned after running them through the paces of tests developed by Genoa Technology. Freedom of Press, for example, choked on files containing the PostScript arc command, which is used to generate curves in PostScript graphics. Files containing this command refused to print in our tests. (Color Age claims to have fixed the problem in Freedom of Press Classic, which recently replaced the Freedom of Press Light version that was shipping during our tests.)

T-Script had problems preventing jagged lines in curves on documents printed on a GCC Technologies PLP II printer. But UltraScript Plus fared the worst. The most expensive PostScript clone we tested, UltraScript Plus, also had the most serious compatibility problems. Multiple Master fonts and TrueType fonts that come in the Apple Fonts pack caused the most problems—with some files simply refusing to print. Until PM Ware comes up with a fix for these incompatibilities, avoid this package.

If you work with any of these programs, here's a tip. In some cases, printing times can be improved and errors eliminated simply by increasing memory. When we increased the memory allocation for Freedom of Press from the suggested 1464K to 3072K, we sliced in half the time it took to print a document containing a variety of TrueType fonts.

The increased memory allocation also made it possible to print a FreeHand document that had been unprintable under the standard memory allocation. In the case of UltraScript, a TrueType document that had been unprintable using the standard 1500K memory allocation printed quickly with 3072K.

If you're going to use a PostScript interpreter extensively, consider accelerating your Mac itself, since the interpreters rely on the Mac's processing power to do their job. Of course, an upgrade pays dividends even when you aren't printing.

For most people who rely heavily on PostScript output, however, clones are no substitute for a true PostScript printer, which will produce fewer printing errors and whip through jobs much faster. But for users who need occasional PostScript capabilities, clones represent a major bargain, giving you high-quality PostScript output at a fraction of the price. A $359 StyleWriter II paired with Freedom of Press Classic gives you impressive-looking PostScript output for only $548. That's a great deal—if you can put up with the longer processing times and occasional compatibility problems.

And all three of these programs support a large number of non-Mac PC printers and can be used to squeeze more life out of an old PC-compatible printer, provided you have one of the Mac-to-PC converter cables described below.

PostScript-Interpreter Options

	Freedom of Press Classic	T-Script 3.30	UltraScript Plus for the Mac
Company	Color Age	TeleTypesetting	PM Ware
Phone	508/667-8585	617/734-9700	619/73B-6633
Toll-free phone	B00/437-3336	○	B00/B45-4843
List price	$149 [A]	$145 [B]	$495 [C]
Number of Type 1 fonts supplied	35	17	43
RAM required	2MB (4MB–BMB for background printing)	2MB	1.5MB
Background printing	●	●	●
Includes preview screen	●	●	●
PostScript editing window	○	●	○
Converts PostScript to TIFF/PICT	○/●	●/●	●/○
Hard drive space required for temp files	2.5MB	5MB	2MB
Batch processing	●	●	○
Logs files printed/built-in spooler	●/●	●/○	○/●

● = yes; ○ = no. [A] Freedom of Press Pro, $1495, offers support for high-end output devices. [B] T-Script Deluxe, $495, supports PICT or TIFF conversion at 2400 dpi; T-Script Basic, $85, does not support PICT or TIFF conversion. [C] UltraScript for the Mac, $195, includes 15 fonts, lacks a spooler, and does not support background printing.

Do-It-Yourself Mac Printers

There are hundreds of dot matrix, ink-jet, and laser printers on the market—but comparatively few are Mac compatible. Several vendors bridge this gap between the Mac and PC worlds with adapter-cable–and–printer-driver packages that

PostScript Interpreter Speed Tests

Fastest result in each test. Times are in seconds. Shorter bars are better. Products are listed in order of overall performance from fastest to slowest.

Testing was done on a Mac IIci, printing to a Hewlett-Packard LaserJet IIIP with GDT's PowerPrint.

[A] 3MB extra memory allocated to match memory allocation of T-Script Deluxe. [B] Standard memory allocation. [C] Could not print with allocated memory. [D] Only Light version was available at the time of our testing; has been replaced by Freedom of Press Classic, which will show identical performance. [E] Allocated extra memory to get it to print.

allow a Mac to print to nearly every PC printer now available. Those packages include GDT Softworks' PowerPrint, Insight Development's MacPrint, and Orange Micro's Grappler IIsp. Such products have been around for a long time, but in recent years their performance has improved, with better compatibility and increased networking options.

All of the packages are hardware-software combinations. Each provides a cable outfitted at one end with a converter that plugs into the parallel or serial port of a PC printer. The packages also include printer drivers for a broad range of PC printers. Some include extra software, such as networking utilities or a built-in *spooler*—a feature that allows background printing and lets you cancel or reorder jobs you have queued for printing.

The best of the packages, PowerPrint, is available in two versions—one for individual users and another, PowerPrint/LT, that lets you share the PC printer with other Macs over an AppleTalk network. The PowerPrint adapter plugs into the Centronics (parallel) port of the printer. The network version of PowerPrint is nearly identical, but includes a bulky external power supply that must be plugged into the adapter.

PowerPrint comes with printer drivers for numerous types of PCs. The drivers for laser printers contain most of the standard LaserWriter driver options, such as the ability to flip images horizontally or vertically on the page and to make photo reductions at any percentage. PowerPrint includes SpoolMaster, a decent print spooler. If you want to use PowerPrint with a laser printer, be sure the printer has at least 1MB of memory, however. Many older laser printers, such as HP's original LaserJet and LaserJet Plus, came with less and can't print a full page.

The Grappler IIsp package also supports network use. To set it up, you connect the converter to the printer's parallel port. On your Mac, you select the ImageWriter LQ driver in the Chooser and then open Grappler IIsp's own control panel, where you specify the type of PC printer you'll be using. The driver options aren't as plentiful as those offered by PowerPrint: you can print at three levels of quality but can only reduce documents to 33 percent and 66 percent.

Grappler IIsp also comes with its own print spooler (it's unusually slow, though), and it's the only converter that allows you to password-protect your printer.

MacPrint is the most bare-bones of the Mac-to-PC printer packages. It connects to the printer's serial port and offers no spooling or networking features. Since many PC printers aren't equipped with a serial port, MacPrint offers less connectivity than its competitors.

Of the cable-driver packages tested, PowerPrint was the best performer followed by MacPrint. PowerPrint printed substantially faster than its competitors on complex Word and PageMaker documents containing a variety of fonts. On a seven-page Word document, PowerPrint finished in less than eight minutes, compared with MacPrint's nearly 13 minutes, and Grappler IIsp's nearly 28. And PowerPrint provided the best quality output on complex graphics and scanned images. But MacPrint sped through a complicated MacDraw Pro drawing and a FreeHand document substantially faster than PowerPrint.

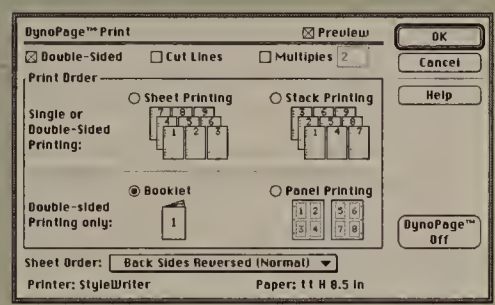
The weakest performer was Grappler IIsp, the least expensive cable package we tested. Grappler IIsp consistently finished on the bottom of the heap in speed tests and offered only crude translations of scanned images and gray scales.

Are converters worth the money? If you already have a PC printer, buying one of these cables gets you a Mac printer for about $149. If you're shopping for a printer, just think of the wide variety of low-cost PC printers you can choose from if you also invest in a PowerPrint or MacPrint converter. Of course, with Mac

ECONOMY PRINTING

Printer utilities do more than add features to your current printer—they can also make print jobs more economical and less wasteful.

Paper Printing documents in double-sided format is an obvious way to cut paper consumption in half, but most people don't bother with it because it is so inconvenient. DynoPage ($89.95) from Portfolio Software (408/252-0420) streamlines double-sided printing on many printers by automatically skipping every other page on a job; DynoPage prints odd-numbered pages, then you flip the stack over and feed it back into the printer, and DynoPage prints the even-numbered pages.



DynoPage offers double-sided and panel printing—features that can drastically reduce paper consumption.

But why print a document on a whole page if you don't have to? DynoPage can reduce documents into half-size or even quarter-size pages—all still quite readable.

Be aware, however, that DynoPage has a host of incompatibilities. It won't work with applications such as SuperLaserSpool, ACI US's 4th Dimension, and some versions of Claris's MacWrite.

Toner, Ink, and Ribbons You can save a bundle on print toner and ink by printing documents in draft-quality mode. Some printer drivers (such as the standard LaserWriter driver) don't have a draft-quality option, but you can add one with Toner Tuner ($49.95, from Working Software, 408/423-5696). This extension adds a slider-bar control to the Print dialog box that lets you precisely adjust the darkness of output before printing draft copies. The lower you set the slider bar, the less toner or ink you use. You can set Toner Tuner's print-quality output down to as low as 0.1 percent of normal. Remarkably, documents printed at that setting are still readable.

Networking Suppose you have a personal printer, but find you now need an office-wide printer that can be accessed by all users on a network. Here are two alternatives to buying a new printer: If you own a StyleWriter, get Apple's updated printer driver, which enables you to share the StyleWriter over a network. Alternately, get ShadowWriter—$109 from Gizmo Technologies (510/623-7899)—a product that makes solo printers fully networkable. ShadowWriter adds other convenient features, such as password protection for each printer, the ability to keep a log of all printing activity on networked printers, and an optional alert sound to signal the completion of print jobs. GDT also offers a full version of PowerPrint with an optimized version of ShadowWriter for $239.

Driver Upgrades Most vendors periodically update their printer drivers, adding features and fixing bugs. If you've had a printer for a year or more, check that you have the latest driver. Driver updates are usually free—a great way to improve a printer's capabilities.

printer prices dropping, you still might be better off with a Mac-specific printer; but if your work calls for printing from both Macs and PCs, a conversion package can save the cost of a second printer.

These packages can also be quite useful if you own a PowerBook and frequently have to print documents while traveling. Instead of buying and lugging around a portable printer, you can just bring along an adapter cable in your suitcase, confident that you'll be able to connect to almost any printer you encounter.

In fact, the folks at Apple have deemed PowerPrint so useful, they've decided to include it in two of their own Mac-to-PC conversion kits. Apple's $219 DOS Companion Kit includes the full PowerPrint package, and the $99.95 Macintosh Print Pack (usually bundled with the Performa) includes a stripped-down version of PowerPrint, which supports fewer printers and lacks a spooler.

Connections to PC Printers

	Grappler IIsp	MacPrint	PowerPrint	PowerPrint/LT
Company	Orange Micro	Insight Development	GDT Softworks	GDT Softworks
Phone	714/779-2772	510/652-4115	604/291-9121	604/291-9121
Toll-free phone	○	800/825-4115	800/663-6222	800/663-6222
List price	$129	$149	$149	$399
Requires additional power supply	○	○	○	●
RAM required	2MB	1MB	2MB	2MB
Port connection	parallel	serial	parallel	parallel
Flips image horizontally and vertically	○	○	●	●
Reduces image by any percentage	○	●	●	●
Prints in background	●	○	●	●
Reorders and/or deletes print jobs from spooler	●	○	●	●
Supports network use	●	○	○	●

● = *yes;* ○ = *no.*

Spoolers and Networking

If your Mac is connected to a laser printer or a StyleWriter, you probably already make use of Apple's own built-in spooler—PrintMonitor. Each time you print a document with background printing active, a copy of the document's printed image, called a spool file, is saved to disk and tucked away in the PrintMonitor Documents folder (located in the System Folder). Then, as you continue with your work, PrintMonitor lines up the files you've sent it in a sequence for downloading to the printer one at a time.

PrintMonitor, however, has serious limitations as a spooler. It shows which jobs are queued for printing, but doesn't let you reorder those jobs or shift a job to a different printer once it's been queued. And PrintMonitor can't show what's happening elsewhere on a network; it can't tell you, for example, which of the three printers on your network is the least busy.

Though such limitations may not affect single users, on even a modest-size network the flow of print jobs to a shared printer can be important in the face of looming deadlines.

A better alternative to PrintMonitor is Fifth Generation Systems' $149 SuperLaserSpool (504/291-7221). This system extension replaces PrintMonitor, handling jobs faster and more effectively.

SuperLaserSpool's Laser Queue desk accessory displays a list of every file waiting to be printed on each printer accessible from your Mac. To reorder print jobs, just drag the jobs listed in the window into the order you want. You can also redirect a job to a different printer. If you send a file to printer A and then discover that moments earlier a coworker sent a 200-page manuscript to that printer, you can use standard cut-and-paste commands in the Laser Queue window to cut your job from printer A's queue and paste it into the queue of printer B.

SuperLaserSpool also offers a few convenient extras, such as a print-preview function (for use with applications that lack their own preview command) and a notification alert option that displays an alert dialog box each time a file finishes printing in the background.

SuperLaserSpool gives you plenty of control over how your own Mac prints, but it doesn't let you change the order of files sent by other users on the network. In fact, print jobs queued by other net-

Driver-Cable Combos down to the Wire

Fastest result in each category in each test. Times are in seconds. Shorter bars are better. Products are listed in order of overall performance for each category, from fastest to slowest.

Multiple Fonts — Print speed for a 7-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.[A]

Single Font — Print speed for a 20-page Word 5.0 document containing double-spaced, 12-point Courier text in plain, bold, and italic.[A]

MacDraw Pro — Print speed for a graphic containing more than 2000 simple objects and several lines of Helvetica text.

FreeHand 3.1 — Print speed for a complex graphic that includes special PostScript effects, nonlinear blends, and Bézier curves.

PageMaker 4.2 — Print speed for a 4-page newsletter using several fonts, a MacPaint image, and 3 gray-scale TIFF images.

All products were tested using a Hewlett-Packard LaserJet IIIP printer.

[A] *TrueType fonts used.* [B] *Gray-scale output was far superior to that produced by competing products.*

BEHIND OUR TESTS

We used a test suite developed by Genoa Technology (805/583-2677) to evaluate PostScript-interpreter compatibility with Adobe PostScript. The tests print PostScript files generated by applications such as Microsoft Excel and Word, and Aldus PageMaker—all designed to include as many combinations of PostScript commands as possible while retaining real-world appearances.

We printed the files to a Hewlett-Packard LaserJet IIIP and compared them with output from a Personal LaserWriter NT (a PostScript printer). The tests were run with a cache-card–equipped Macintosh IIci running under System 7.1 with 8MB of memory and an internal Quantum 80MB hard drive. When we had trouble printing a file, we tried again with additional RAM installed and different software settings.

For speed tests, we used documents that created diverse challenges for the clones. These included a single-font text document, complex Aldus FreeHand and Claris MacDraw Pro documents, a PageMaker file that shows the ability to handle gray-scale images, and a multiple-font test.

We ran the same benchmarks for our test of PC-printer cable-and-driver combinations. In addition to testing the software on a IIci, we timed each product on a Performa 200 with 4MB of RAM and a 40MB hard drive to account for the popularity of these packages among users of less-powerful machines.—**Macworld Lab testing supervised by Mark Hurlow**

work users don't even appear in SuperLaserSpool's queue window. To get a broader picture, consider adding Blue Parrot, $149.95 from Casa Blanca Works (415/461-2227). This control panel lets you check on the status of all the printers being shared over a network.

Unlike SuperLaserSpool, Blue Parrot doesn't replace PrintMonitor; it works along with it. Behind the scenes, Blue Parrot continuously monitors the contents of all the PrintMonitor Documents folders across the entire network and displays a list of all the jobs waiting to be fed to all printers. For Blue Parrot to work effectively, all users on the network must have the control panel installed.

For each job, Blue Parrot lists whose Mac sent the job, and the number of copies and pages to be printed. Blue Parrot doesn't allow reordering or rerouting jobs once they've been spooled. It simply provides an overview of the network activity. By knowing in advance which printers are busiest, you can route your output to an idle printer, or at least one with fewer files lined up for printing.

So much for theory. In our tests, Blue Parrot didn't always provide an accurate display of upcoming print jobs. Sometimes a job appeared to leapfrog over others to the top of the queue. Or a job not listed on the queue suddenly became the active job. Also, Blue Parrot was incompatible with SuperLaserSpool, though Casa Blanca Works says it will soon resolve the incompatibilities. And even when it works, Blue Parrot doesn't give you control over how print jobs from all users are routed across an entire network. For that, you need print server software.

Print Servers

Print servers—Macs connected to a network designed to receive files for printing from multiple users—arrange jobs in queues and send them one by one to designated printers. Because the server handles all the downloading of files to the printers, individual users' Macs free up more quickly after print jobs are ordered.

Apple's AppleShare Server 3.0.1 package ($1199) includes network-administrator software for setting up and maintaining a print server that can route files to up to five printers. For each printer connected to the network, the administrator can view a print queue window that provides information on the printer's activity. The administrator has the power to reorder jobs as they are spooled to the server and redirect files to less-busy print stations to head off a bottleneck. The administrator also can allow users to bypass the spooler on the print server and print directly to a printer if necessary.

A less expensive alternative is Print Central, $795 from Compumation (814/238-2120). Like AppleShare Server, Print Central enables you to set up a centralized print server on a dedicated Macintosh, but with options that give the network administrator even more control over printer activity.

It supports multiple queues for each printer. Conversely, a single queue can be routed to up to six different printers. In this way, network users can send files to a single Chooser-selectable queue—but the work can be printed automatically on any available printer linked to its queue.

Print Central makes such a configuration surprisingly easy. In the program's status window, just draw lines on screen from the queue names to icons of the printers, adding as many lines as you need to route a queue to a specified printer.

Like AppleShare, Print Central lets you decide which users have access to certain printers. You can permit users to print directly to a specified printer—or you can hide printers so that only the server queues and not the printers are selectable from the Chooser. In this way, the administrator can see to it that all printer traffic is routed through the server. This feature did not function well in our tests, however. Every time printers were designated as hidden, they went completely offline and had to be restarted to be found by the Macs again.

Both AppleShare and Print Central allow an administrator to log networkwide printing activity. AppleShare records a separate print log for each queue. Print Central includes all activity on all printers and queues in a single report that can be sorted by user, job, or date.

Think before Buying Hardware

This combination of better output and improved print formatting and connectivity suggests that resourceful Mac owners can increase the quality and sophistication of their printing without buying new hardware. Not that you'll always see miraculous results. A new printer driver or spooler may mean only a modest boost in productivity. But a PostScript clone or PC cable-and-driver combo can radically alter the way you work—and save you money in the process. **m**

JOSEPH SCHORR is a journalist, a playwright, and coauthor of the just-released *Macworld Macintosh Secrets* (IDG Books Worldwide, 1993).

PRINTER UTILITIES

We didn't find a PostScript emulator worthy of our Editors' Choice designation, but among the three non-Mac PC-printer cable packages, a clear winner emerged.

PowerPrint This product had the fewest problems handling graphics files sent from a Mac to a PC printer, and came out on top in most speed tests. **Company:** GDT Softworks. **List price:** $149.

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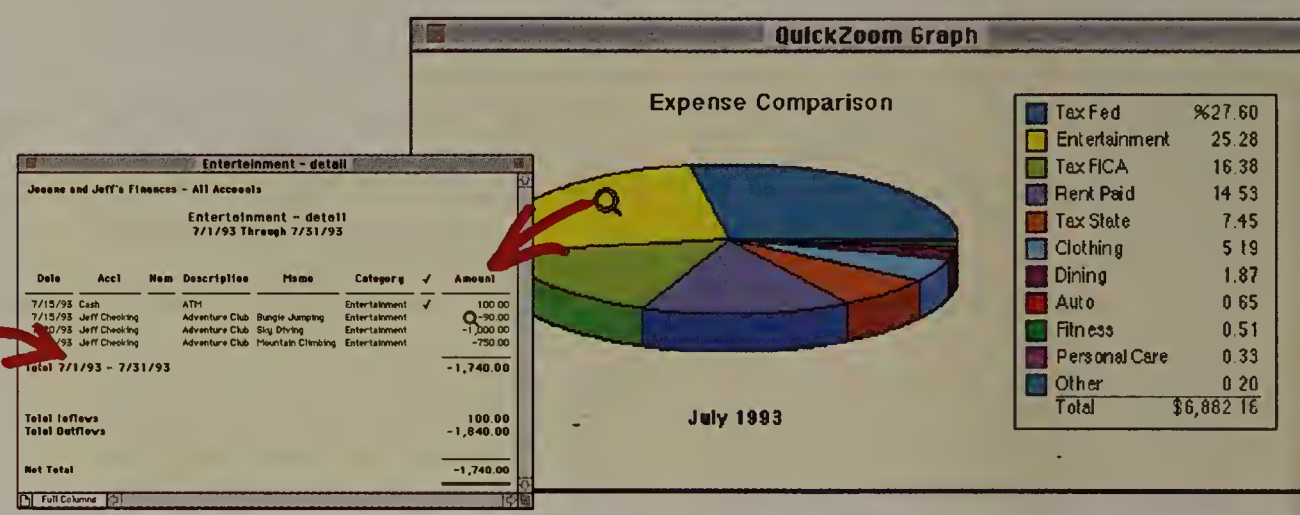
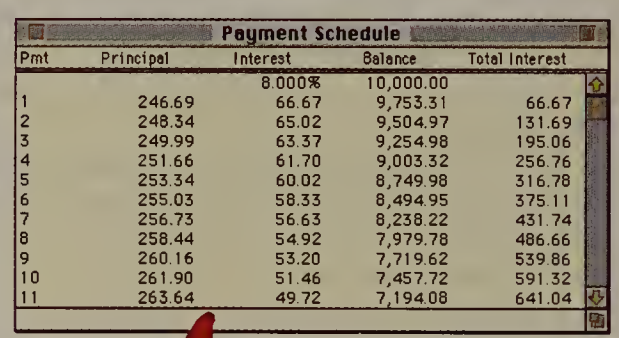
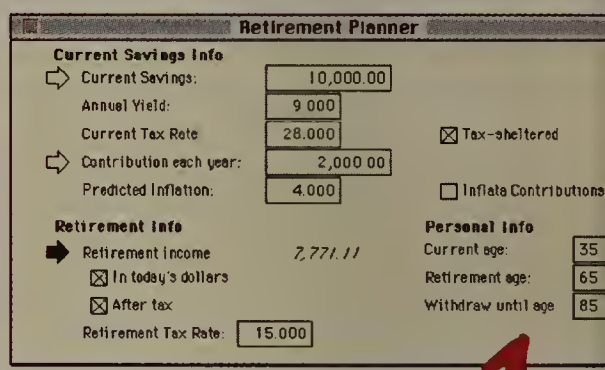
See the numbers behind the numbers





Track your loans



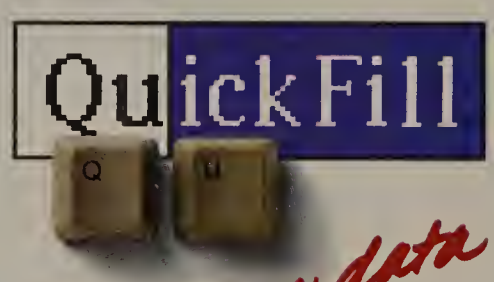
Plan the future

How do you improve a product that many people think is already perfect?

In our case, we listened to some pretty radical suggestions from some of the 4 million users who wanted Quicken to be even easier, faster, and more fun to use. The result is the most exciting announcement since we introduced Quicken: new Quicken 4, a major upgrade, with over 100 new features, that breaks new ground in financial organization. Here's a preview of some of those new features:

Slash data entry with QuickFill.™

Just start typing, and as the characters match a transaction you've entered before, Quicken fills in the rest of it automatically. Which means you'll never have to type the same transaction twice. What a time-saver!



Less data entry

Get greater insight with graphs.

Graphs make it simple to spot financial trends at a glance. Use a bar graph to see how your spending patterns change over time. Or a pie chart to provide a dramatic overview of payments by categories. It's a great way to get real insight into your income and expenses, investments, net worth, and budget vs. actual.

QuickZoom™ delivers the numbers behind the numbers.

Just double-click on any number in a report or any part of a graph, and QuickZoom shows you the transactions that make up that number. Click again and see a specific transaction in your register. Now getting insight into your finances is incredibly simple!

Easy investment tracking.

Quicken can manage all your inves ments — stocks, mutual funds, brokerag accounts, bonds, and others. New Quic 4 offers QuickAction Forms that make potentially complex procedures Quicke easy. Investment reports let you always know how your investments are perform and provide detailed trade and capital g information for taxes. So it's simple to manage, analyze, and plan your portfoli

Loan amortization made easy

Quicken tracks your loans by auton cally calculating principal and interest, then providing a complete loan paymer

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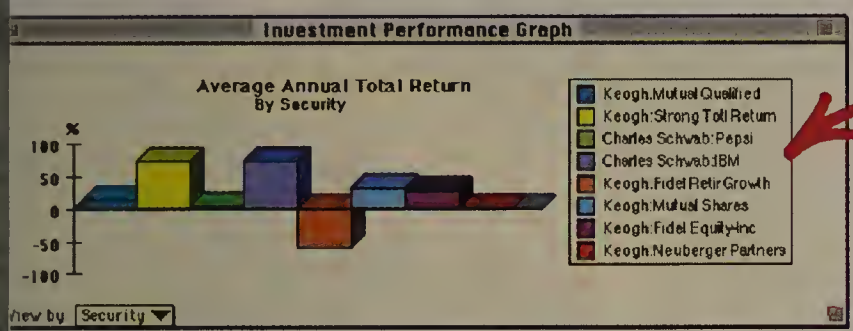
mprovement in financial nvention of Quicken.



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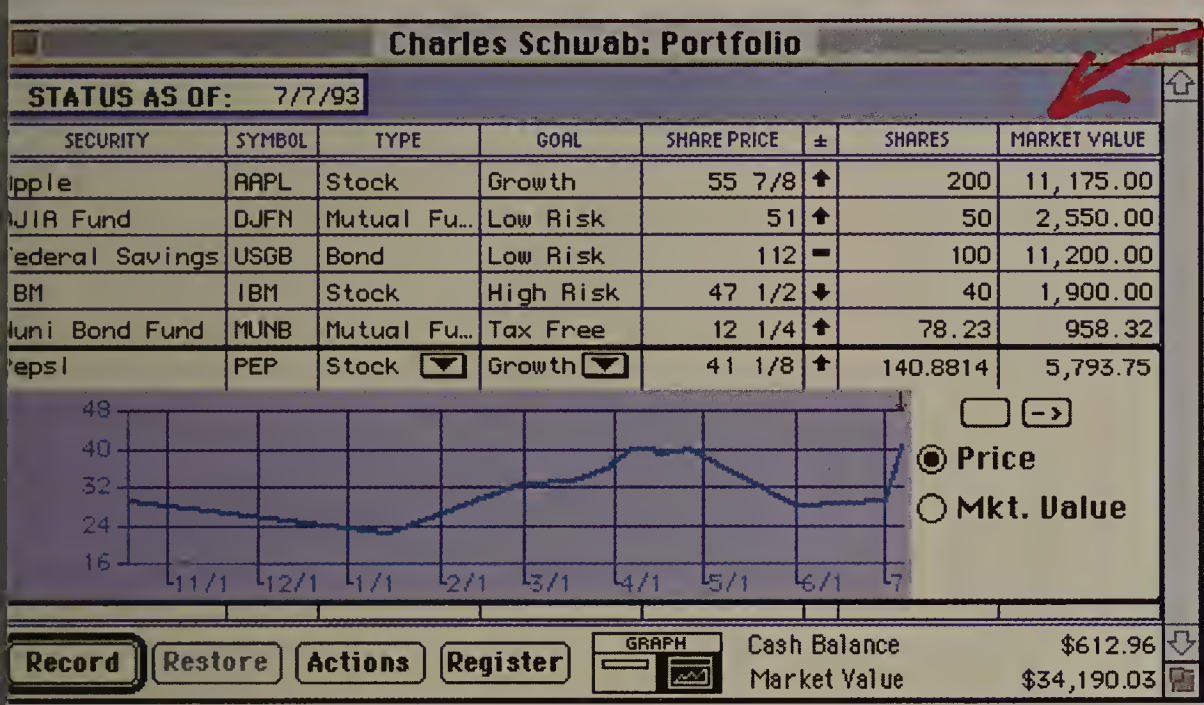
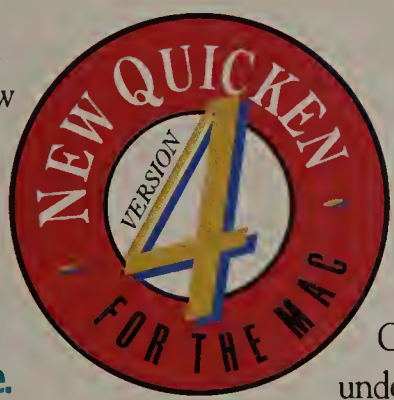


Track investments

chedule. New Quicken 4 handles a ariety of loan options, including ariable interest rates and balloon ayments. Now you'll always know ow much interest you've paid nd exactly what your loan alances are.

Handy financial planners let you see into your future.

Wouldn't you love to be able to nake "what if" calculations to plan for he future? Quicken 4 lets you make mart financial decisions regarding loans, nortgage refinancing, investment and aving, retirement, and college savings.



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1. Upgrade directly from Intuit for only $29.95.* Or...
2. Find the best price, then purchase Quicken from your favorite software dealer. If you're a previous Quicken owner, the deal is even better — with a **$10 rebate.**†

As you can see, there's a lot to like about new Quicken 4. But this is just the tip of the iceberg. In all, there are over 100 powerful new features to let you organize all your finances. With the ease-of-use to get it done quickly. And a price that's a true bargain. Plus a 60-day money-back guarantee.

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SEVENTH ANNUAL

World-Class Awards

BY MARJORIE BAER

Readers pick the top Macintosh products in 36 categories

Year in and year out, as new products, new product types, and new technologies enter the Macintosh marketplace, the editors of *Macworld* labor to determine which among the myriad merit your hard-earned dollars. We struggle to devise objective critical criteria by which to judge: performance benchmarks, features lists, and design considerations. Based on these, we assign Star Ratings and designate Editors' Choice products.

But once a year we turn to you, our readers, and ask for your recommendations. It is on the basis of your judgments that we award the coveted *Macworld* World-Class Award.

In years past, we've asked readers to write in their favorite products in categories that we identified. As the marketplace grew more crowded and more complex, the ballot expanded from 40 or so categories to more than 60. This year we experimented with a more open-ended ballot, asking you to list up to 10 hardware and software products you use every day, and then to assign each one a rating from 1 to 10 reflecting how satisfied or dissatisfied you are with its performance. We hoped this would lead us beyond a superficial popularity contest. We wanted to find out not only *what* you've chosen, but also *how well* it actually serves you.

To no one's great surprise, many perennial favorites are back, a few for the fifth time. There's more than just marketing behind the success of the big players. Solid design, free or inexpensive upgrades, and responsive technical support all contribute to customer satisfaction. What goes into creating a truly fanatical following, we suspect, is a mysterious alchemical blend.

We were gratified that by focusing on customer satisfaction (what we jokingly referred to as "the passion index") a few Davids were able to stand tall among the Goliaths. ProVue Corporation's Panorama database, for example, with its relatively small but ardent following, bested the giant—Claris FileMaker. And this year's World-Class Award winner for telecommunications software is Dave Alverson's ZTerm, a shareware product.

At the same time, our decision not to actively solicit votes in predetermined categories meant that some product areas are not represented in this year's results. Not that there weren't any votes in those categories—from the looks of things, there's hardly a product ever created for the Macintosh that one of our readers hasn't used and formed an opinion on. But for a variety of reasons, some of these didn't register on the passion index.

In some cases, no news is probably good news. After all, reliability is kind of an invisible virtue; it's only when a product fails that you think about its reliability, and then not fondly.

In other categories—such as video-editing software and graphics accelerator boards—we received too few entries to yield a statistically supportable decision. For opinions on these kinds of products, rely on *Macworld*'s own lab and editors.

To all the 1993 World-Class Award winners, our sincere congratulations. To our readers, thanks for your opinions. And keep watching these pages for news of the 1994 contest. In the meantime, the next few pages showcase this year's winners and share some insights on our readers' thoughts.

Macworld

Presentation

BUSINESS PRESENTATION
Aldus Corporation/**Aldus Persuasion**
Microsoft Corporation/**Microsoft PowerPoint**
IDEA GENERATION
Inspiration Software/**Inspiration**
AUTHORING
Macromedia/**Macromedia Director**
Claris Corporation/**HyperCard**

Inspiration is not easily classified, but its loyal following earns it a World-Class Award from readers who depend on its ability to help them brainstorm and visualize, whether working alone or with a group.

Publishing

PAGE LAYOUT
Quark/**QuarkXPress**
GRAPHICS UTILITY
Aldus Corporation/**Aldus Fetch**

Three years the bridesmaid, this year the bride, QuarkXPress edged past Aldus PageMaker in the page-layout category. It's paired here with newcomer Aldus Fetch, a multiformat database application singled out for its image-cataloging abilities.

Systems

DESKTOP COMPUTER
Apple Computer/**Quadra 950**
NOTEBOOK COMPUTER
Apple Computer/**PowerBook 180**
Apple Computer/**PowerBook Duo 230**
MONITOR
Radius/**Pivot Display**
INPUT DEVICE
Logitech/**MouseMan**
Logitech/**TrackMan**

Can money buy happiness? Owners of high-end Macintoshes apparently believe the investment pays off, and these Macs outdistanced the more affordable business models. Interestingly, the leader among a very large field of video-display monitors is a gray-scale unit—the Radius Pivot.

Printing

INK-JET PRINTER
Apple Computer/**StyleWriter II**
LASER PRINTER
Hewlett-Packard/**LaserJet series**
PRINT UTILITY
Adobe Systems/**Adobe Type Manager**
Light Source Computer Images/**Ofoto**

Some products become instant classics, like Apple's new, economical StyleWriter II ink-jet printer, while others have a long-term following, such as Hewlett-Packard's venerable, speedy LaserJet series (the 4M is shown here).

Image Editing

IMAGE EDITOR
Adobe Systems/**Adobe Photoshop**
SCANNER
Hewlett-Packard/**ScanJet IIp**

In both categories, the winners won hands down, proving that both Adobe Photoshop and the HP ScanJet IIp 8-bit scanner are deservedly well-entrenched standards.

Drawing/Illustration

DRAWING/ILLUSTRATION
Deneba Systems/**Canvas**
Aldus Corporation/**Aldus FreeHand**
Adobe Systems/**Adobe Illustrator**

Rivals Adobe Illustrator and Aldus FreeHand, both previous World-Class Award winners, are joined this year in a three-way tie with Deneba's Canvas. After committing to one drawing package over the others, many Macintosh illustrators are hard to budge. But others we know happily play the field.

Core Business Software

WORD PROCESSOR
WordStar International/**WriteNow**
SPREADSHEET
Microsoft Corporation/**Microsoft Excel**
DATABASE
ProVue Corporation/**Panorama**

ProVue's Panorama, far less well known than the big players in the database field, earns the respect and allegiance of its users, and received a higher rating than any of its competitors. The other surprise is WriteNow, an inexpensive and compact workhorse purchased recently from T/Maker by WordStar International.

Storage

HARD DRIVE
APS Technologies/**APS drive series**
REMOVABLE STORAGE
Iomega Corporation/**Bernoulli series**
BACKUP/STORAGE UTILITY
Aladdin Systems/**StuffIt series**
SYSTEM PROTECTION/ RECOVERY UTILITY
Symantec Corporation/**SAM**

In categories with many competitors, several standbys got the readers' nod. For all the types of storage utilities that readers nominated, those concerned with data protection and integrity outpolled the rest.

Telecommunications

FAX MODEM
Global Village Communications/ **PowerPort series**
COMMUNICATIONS SOFTWARE
Alverson Software/**ZTerm**

This year's winner for communications software is a shareware product, Dave Alverson's ZTerm (not pictured). Global Village, maker of the World-Class PowerPort series of fax modems for the PowerBook, likes ZTerm so much that the company bundles it with its modems.

Personal Business

INTEGRATED SOFTWARE
Claris Corporation/**ClarisWorks**
Symantec Corporation/**GreatWorks**
ORGANIZATION/ PRODUCTIVITY
Portfolio Software/**Dynodex**
Advanced Software/**InTouch**
After Hours Software/**TouchBase**

The personal aspect of this software no doubt accounts for the ties in both categories—you have to be a believer to commit to a product that helps you manage your life.

Accounting

PERSONAL ACCOUNTING/ FINANCE
Teleware/**M.Y.O.B.**
Intuit/**Quicken**

Both Teleware's M.Y.O.B. and Intuit's Quicken enjoy a high degree of reader satisfaction, setting them apart from the competition.

Development and Analysis

STATISTICAL ANALYSIS
Abacus Concepts/**StatView**
DATA PRESENTATION
DeltaPoint/**DeltaGraph Professional**
PROGRAMMING ENVIRONMENT
Symantec Corporation/**Think Pascal**

A perennial runner-up to its sister program, Think C, Symantec's Think Pascal's satisfied users pushed the product into first place among the programming environments. And here's a statistic for you: back for its sixth World-Class Award in the statistics category is Abacus Concepts' StatView.

Best Customer Support

HARDWARE
Apple Computer
SOFTWARE
Microsoft Corporation

Both companies again win the World-Class Awards in this category, as they have each year since this category was established in 1991.

Most Promising Newcomer

HARDWARE
Apple Computer/**LC III**
SOFTWARE
Aldus Corporation/**Aldus Fetch**
Adobe Systems/**Adobe Dimensions**

The LC III, released only five months ago, immediately struck a chord with users looking for a midprice color Mac—so much so, in fact, that Apple has had to struggle to meet demand. Two new types of tool caught on with developers and graphic artists alike. Both Adobe Dimensions, a 3-D utility, and Aldus Fetch, a multi-format file-cataloger, edged out competing products from other companies.

For Fun

DESKTOP UTILITY/ENHANCEMENT
Berkeley Systems/**After Dark series**
EDUCATION/ENTERTAINMENT
Brøderbund Software/**Kid Pix**

Our readers are always on the lookout for that little something to make their Macs more personal. Some users swear by file-management utilities, others by macro recorders or hard drive optimizers. But just try taking away one of their After Dark screen savers, like Star Trek. Kid Pix, Brøderbund's noisy, whimsical paint program for kids, also has its not-so-secret adult devotees.

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Paint and Draw	256 custom	81 draw	256	NO
Common tool bar with module-specific tools	YES	NO	NO	NO
Log-in scripts/phone book	YES	NO	NO	YES
Multiple columns can be turned on/off anywhere on the page	YES	NO	NO	NO
Auto Sum Tool	YES	NO	NO	NO

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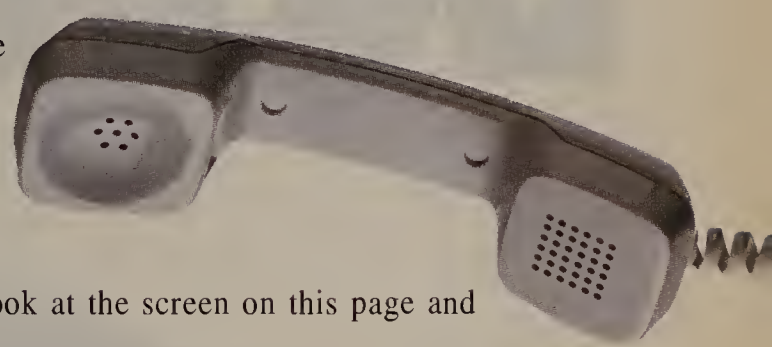

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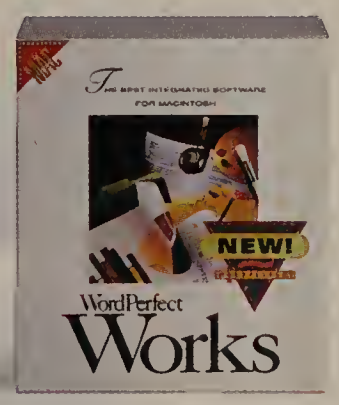

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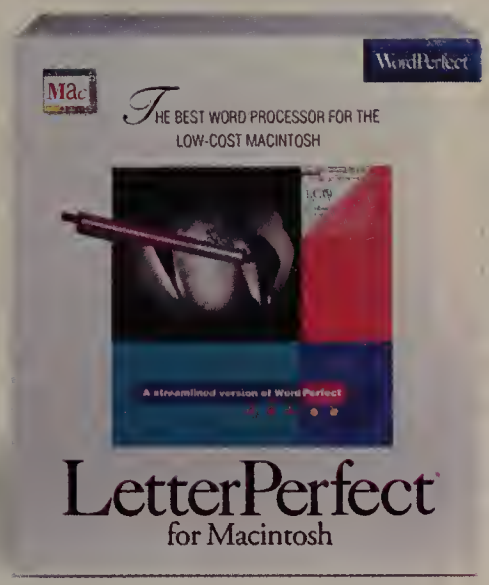

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EDITED BY JAMES A. MARTIN

Graphics

THE LATEST IN DESIGN, PUBLISHING, AND PREPRESS

High-Speed, High-Res Image Editing

WITH SPECULAR INTERNATIONAL'S recently introduced Specular Collage, Mac designers can rotate, resize, skew, and apply filters and other tools to high-resolution, continuous-tone graphic files in a fraction of the time it takes to perform those tasks in Adobe Photoshop or other image-editing applications, according to Specular.

Specular Collage is an object-oriented image-composition program that lets you manipulate high-resolution files using proxies—low-resolution (72-dpi) screen representations of the image. You can define each image element as a separate proxy and place multiple elements on a canvas layout for individual editing. If the imported image contains an alpha channel, Collage lets you use the channel as a mask. This process enables you to manipulate the mask in real time, and view the results without the continuous copying and pasting of an image using the alpha channel in Photoshop. Once you're done, Collage's Render command tags the changes to the original high-resolution file and rasterizes that file for final printing—all of which should save significant amounts of redrawing and rasterizing time.

Specular isn't the first program to offer fast editing of high-resolution images on the Mac. A French company, Advanced Imaging S.A., recently announced its graphics technology for editing, scaling, and zooming high-res images at workstation speeds on a Mac. That technology is the basis of a $5000 application called Live Picture, scheduled to be available in the United States in June. (For more information, see *Macworld News*, August 1993.) Collage was expected to ship by the time you read this. The suggested retail price wasn't set at press time, but should be under $400. Specular International, 413/549-7600.—J.A.M.

JOSEPH KELTER/BAD CAT DESIGN

Specular Collage enables you to easily and quickly edit complex graphics, such as the above image.

Painter/X2 Adds Multilayer Flexibility

FRACTAL DESIGN'S PAINTER/X2, A new extension to its paint and image-enhancement program Painter 2.0, gives Painter users the flexibility of working with essentially unlimited floating selections in an image.

Because each floating selection has its own layer, you can work on each selection independently and in any order—you can reposition them, change their layering order, or directly apply any Painter effect. Even after images are saved and reopened, floating selections can be repositioned and modified, enabling you to easily experiment with variations of the image.

Painter/X2 allows you to create floating palettes (color sets) and will include several predefined ones, including Pantone and RGB. With the Annotate feature, you can label the individual colors in a color set. And because they reside in a separate layer, annotations can be turned on or off.

Now available, Painter/X2 lists for $149 but is available at an introductory price of $79 through September. For more on Painter, see the feature "Brilliant Strokes" in this issue. Fractal Design, 408/688-5300.—CATHY ABES

Claris Retires MacDraw, Unveils Two Graphics Programs

CLARIS IS RETIRING ITS AGING MacDraw II and MacDraw Pro packages in favor of a cross-platform, 24-bit draw application with built-in intelligence offering more-precise line drawing and placement, among other features.

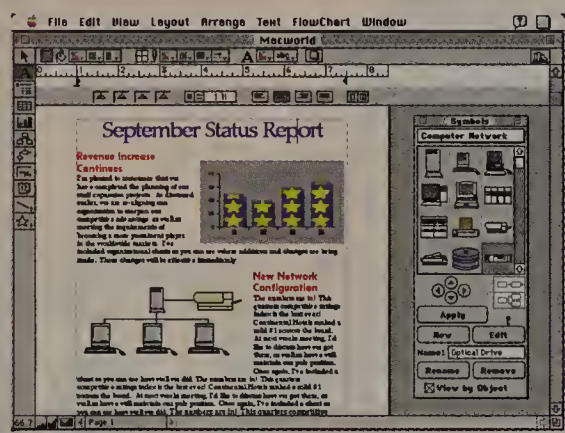
The company is also introducing a separate graphics package that combines word processing, presentation, and graphics capabilities and is primarily aimed at business users. Both programs, ClarisDraw and a program code-named EasyStreet, are based on the same Claris Graphics Engine code and will be available for the Mac as well as for Windows-based PCs.

ClarisDraw is a completely new draw program. Among its features is an intelligent point guide, which is designed to let you place objects on screen accurately. As you move an object, the cursor gives visual clues to help you position the object precisely. As with Aldus IntelliDraw and Deneba's Canvas 3.5 update, you can also link objects; changes made to one object are made to all linked objects. ClarisDraw includes 3000 clip art images as well, which you can place into a drawing layer by dragging them from the object library.

Claris expects to ship the Mac program by early 1994 for a suggested retail price under $400. Final pricing and details on upgrading from either MacDraw program to EasyStreet weren't final at press time.

EasyStreet combines word processing, page layout, and presentation tools. It offers the ability to import spreadsheet data and create tables, charts, and graphs automatically by clicking on an icon bar and to customize those graphic elements using style templates.

Although you can import 24-bit color graphics, EasyStreet supports only 256 colors. The program supports most common PC and Macintosh word processing, graphics, and spreadsheet formats, including WordPerfect, Microsoft Word and Excel, PICT, TIFF, EPS, and CGM.



Hot Links ClarisDraw features enhanced text handling; customizable object libraries with more than 3000 pieces of clip art; and the ability to automatically link and align objects and text.

EasyStreet for the Mac is expected to ship by late fall for a suggested retail price under $400. Claris Corp., 408/727-8227, 800/544-8554.—J.A.M.

IN BRIEF

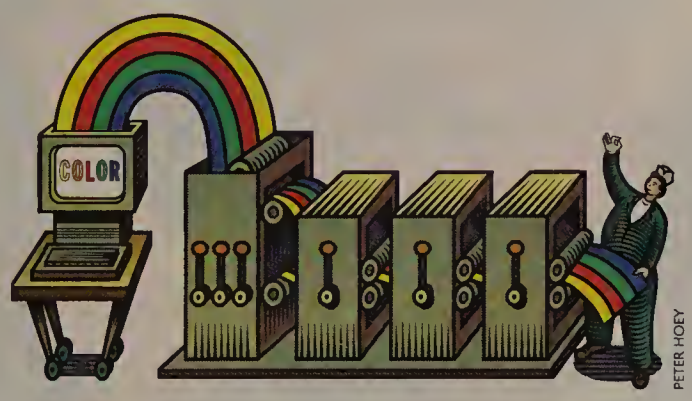
■ **DeltaPoint's Graphics Utilities** DeltaPoint is now shipping Graphics Tools, a $169.95 package of utilities for editing 24-bit color images, converting graphics file formats, generating screen captures, performing color separations, and locating graphics files. 408/648-4000.

■ **Font Battle Looms** Adobe Systems, Bitstream, and three other font vendors are suing Swfte International, alleging that Swfte copied all or part of their font designs, among them Bitstream's Star Trek, for its Typecase font foundry products. The suit seeks unspecified damages and a permanent injunction to stop sales of Typecase. This is the first test of the U.S. Copyright Office's 1992 ruling that digital typefaces aren't considered intellectual property and thus are not protected by copyright laws. Swfte denies the charges.

■ **Photos at Your Fingertips** FPG International, a stock-photo agency, has announced CD Selects Vol. 1, a CD-ROM containing 5700 low-resolution photos from FPG's archives—one of the largest collections of digital images yet released. The images are for reference and page-layout positioning only; to obtain high-resolution versions of the image, you must contact FPG. The $175 disc includes a search-and-retrieval interface developed by 3M Corp. 212/777-4210.

Matching Mac Colors to Your Printing Press

PUBLISHERS HAVE HAD THE ability to match colors on a monitor to those generated by a desktop printer for several years now. But under an agreement between Electronics for Imaging (EFI) and R. R. Donnelley, desktop publishers can save money and time by matching the colors on a Mac, PC, or Unix workstation monitor to those of an offset printing press.



PETER HOEY

EFI's agreement with Donnelley is to create custom color profiles of offset-press inks for Donnelley's yellow-pages directory printing customers—the first time desktop color matching has reached into the realm of offset printing. Donnelley, in turn, will sell the press profiles along with other EFI software such as the system-level color-management program, EFIColor, to directory publishers.

EFI plans to create custom press profiles for other printing companies as well, such as four-color national magazines. An EFI spokesperson wouldn't say when such profiles would be offered, however. EFI and Donnelley are focusing initially on the enormous directory-publishing market because of its dependence on custom print jobs and nonstandard inks.

Using EFI's color press profiles on a Mac or other desktop computer, publishers can save money and time by reducing or eliminating the need to output film for color proofs such as Matchprints or Chromalins. Instead, they could frequently rely on digital proofs printed on such devices as dye-sublimation printers.

By eliminating the need for film, the EFI-Donnelley agreement could also move publishers a step closer to direct-to-plate printing. Without the need to continually check colors, publishers can transmit files separated in QuarkXPress or other programs directly to one or more Donnelley plants, where a publication can be printed, bound, and distributed. EFI, 415/286-8600.—J.A.M.

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J-12-01-U

It's a wild world, and here's how it was created. Original pencil sketch of the Mandrill is scanned for use as a template. ❶ Sketch is now traced with Pen tool. ❷ Two shapes that compose ear are constructed with Divide Fill tool. Mane is built with three tools: ❸ Star filter creates a basic jagged shape; ❹ Scribble filter randomizes star points; and ❺ Twirl filter alters star point angles. ❻ To create eyes, three colors are selected and placed in circular gradient. ❼ Multicolor gradient generates this medley of tones with less banding. ❽ Pathfinder tool is used in headline to isolate and create shapes occurring where areas intersect, permitting them to be colored separately. ❾ Clicking on placed images can automatically launch Adobe Photoshop™ and its powerful tools. Paint Style Box (not shown) allows quick and easy selection of commonly used colors. This entire ad was created in Adobe Illustrator 5.0. Illustration by Ron Chan.

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BEHIND MACWORLD'S GRAPHICS

By Cathy Abes

Artist: San Francisco–based illustrator Ron Chan has produced posters for various clients including the Kennedy Center and Estēe Lauder.

Techniques: To illustrate our feature on draw programs, Chan began in Illustrator, creating a grid to use as a guide for a pencil sketch of his basic composition.

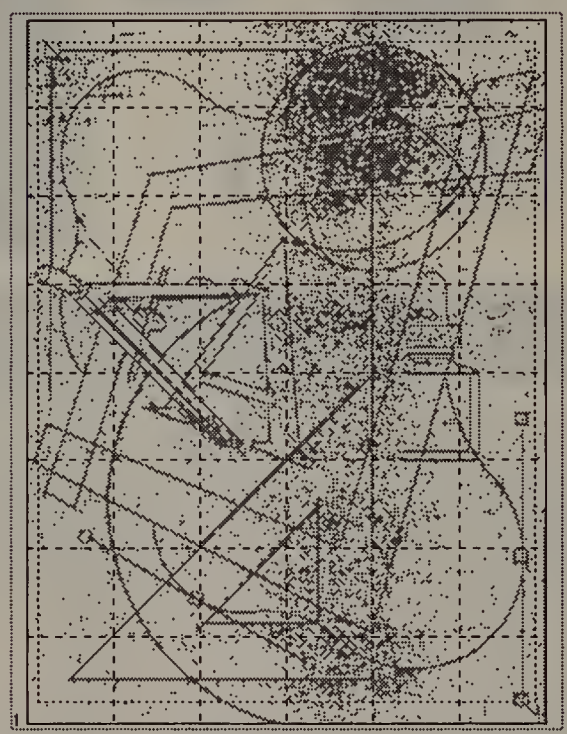
After drawing the top and bottom edges of the pantograph (scaling tool), which surrounds the *A*, Chan used a blend to create evenly spaced increments between those edges to function as perspective guidelines. He used the same technique to create incremental guidelines between the left and right sides of the pantograph.

To create the *A*, Chan used Ray Dream's addDepth—which lets you add a three-dimensional look to type—because of its strong perspective tools. After drawing the compass in Illustrator from his scanned sketch, Chan imported it into Adobe Dimensions, a program for adding 3-D effects to 2-D art.

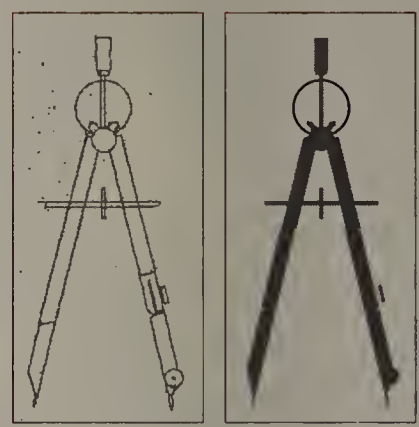
Because it was impossible for Chan to overlay a 3-D object from either addDepth or Dimensions above its 2-D counterpart in Illustrator and then reposition the 3-D object using the Illustrator image as a guide, he had to improvise to find the object's correct angle and perspective. Creating numerous versions of the *A* in addDepth, he imported each one into Illustrator to compare it with the original, until he found one with the correct perspective. He then followed a similar trial-and-error method with the compass created in Dimensions.

The curved background consists of overlapping circular shapes drawn in Illustrator. To define the various segments of the curves, Chan cut the circles' intersecting lines, deleted unneeded parts, and joined the cut points.

Chan created the thick, curved edges along the background by masking a copy of the background objects. He also used masking to create the illusion of transparency, such as making the pantograph appear to show through the globe. m



1 After scanning in this pencil sketch as a 1-bit image, Chan opened a new file in Illustrator, selected the scanned image as a template, and pasted a grid (previously created in Illustrator) on top of the template. He then turned the grid into a guide with the Make Guides command.



2 Chan drew a rough pencil sketch of the compass, scanned it, and opened it in Illustrator (left), where he made it into a template to use as a guide for drawing the 2-D version of the compass.

3 In Adobe Dimensions, Chan extruded parts of the compass into three-dimensional shapes, then used other parts as guides for creating original 3-D shapes (to replace the 2-D Illustrator objects). At top is a wire-frame view; at bottom, a rendered view after extrusion and rotation.

THE TOOLS

Hardware: Mac Quadra 950 with 24MB of RAM and a 500MB internal hard drive; 20-inch SuperMac SuperMatch color monitor; SuperMac 24/PDQ 24-bit accelerated color graphics board; PLI Infinity 40 Turbo SyQuest removable-cartridge drive; Microtek 300ZS color scanner.

Software: Adobe Illustrator 3.2; Adobe Dimensions 1.0; addDepth 1.0.1.

6 To produce the translucent effect where the globe and pantograph overlap, Chan copied the pantograph segment, made the globe a mask, and grouped it. Using Illustrator's direct-select tool, he clicked on the globe and pasted the pantograph in front (⌘-F)—to group it with the globe, as part of the mask. He then darkened the pasted pantograph.

7 To create the thick rules on the curved edges of the background objects, Chan first copied a background object and made the original into a mask, then pasted the copy in front of the original. He then changed the copy's attributes to a 10-point rule and no fill.

CHAN

4 After drawing the overlapping circles and ovals he would use to create part of the curved background, Chan cut the line segments wherever two circular shapes intersected.

5 Once he had deleted the unwanted segments, Chan selected the two points where he had made the cut, averaged the points along both axes, and joined them with a smooth point.

Read my

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HEWLETT PACKARD

A GUIDE TO THE BEST

BRILLIANT STROKES

There's no doubt: image editing—the ability to change an image's colors, apply special effects, or combine part of one scan with a piece from another—is a feature that has made paint programs one of the hottest product categories for the Mac.

But you don't have to spend hundreds of dollars on Adobe Photoshop to get image editing. Today, even low-cost paint applications (such as Expert Color Paint, $49.95) offer at least minimal image-editing capabilities such as blurring and sharpening. And many paint programs support Photoshop-compatible plug-in modules, so you can expand a paint program's capabilities with a special-effects collection such as Kai's Power Tools (see the table, "Top Paint Programs Compared").

The ability to create eye-boggling photomontages and other special effects does not a worthwhile paint program make, however. These days, the best all-around 24-bit color paint programs offer *antialiasing*—the blending of pixels around the edges of an image to diminish jaggedness; *masking*, to isolate a part of an image, so it can be manipulated or merged into another image; a virtual memory scheme, which enables a program to open large images when memory is limited; and support for JPEG compression and QuickTime (with QuickTime installed, you can apply JPEG to any PICT file).

I looked at a dozen 24-bit color paint programs with an eye toward image-editing capabilities, natural media and other paint tools, ease of use, and the number of features you get for the money. From that dozen, I've identified five programs that stand out in some way from the crowd; the others I've summarized in a sidebar (see "Paint Programs That Need a Touch-Up"). Several programs, such as Aldus SuperPaint, UltraPaint, artWorks, and ArtBeat Professional, combine both drawing and painting layers; for more information on those applications, see the feature "Fine Lines" in this issue. A final version of WaterColors, a 24-bit program to be bundled with a guidebook on watercoloring, wasn't available for review at press time. It's due out this fall for under $70. For more information, call Walter Foster Publishing at 714/544-7510 or 800/426-0099.

Expert Color Paint 1.0

At $49.95, this is *the* least expensive full-color Mac paint program. For a street price of less than $30—that's less than Photoshop's *sales tax*—you get a program that offers all the low-end paint essentials as well as some capabilities that higher-priced programs lack (such as multiple undos, missing from Photoshop).

For all its low-priced functionality, Expert Color Paint is *not* for experts. It can't soften the edges of selections using antialiasing or feathering, which diminishes its usefulness for creating photo montages. Its special-effects capabilities are limited; there are no masking options; heck, you can't even fill a selection with a solid color. But who cares? Expert Color Paint is just the thing for editing screen shots, painting quick images for use in newsletters and other casual documents, and lightly touching up scans. And did I mention its low price?

BrushStrokes 1.0

If you're new to computers and want to experiment with a paint program, BrushStrokes ($139)—developed by Casady & Greene and sold by Claris under the Clear Choice label—was designed with you in mind. Not only does BrushStrokes offer context-sensitive online help, every dialog box includes an information panel that explains how individual options work. The full-color documentation does a good job—despite some goofy graphics—of walking you through both the artistic process in general and BrushStrokes' features specifically.

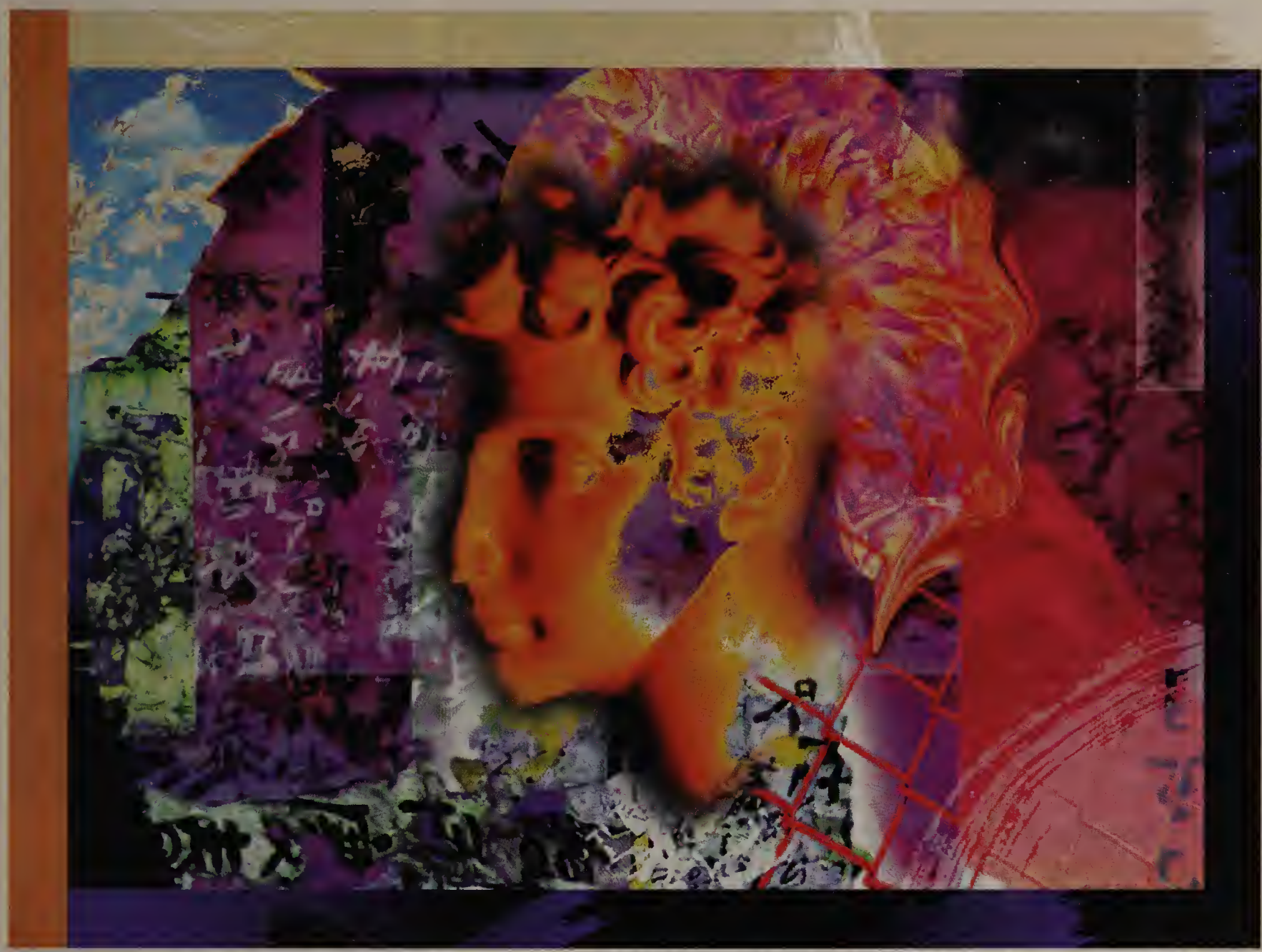
BrushStrokes offers some time-saving conveniences, too. You can access any tool from the keyboard and keep track of all colors that you select with the eyedropper tool. The eyedropper lets you mask selected colors, ignore those colors when selecting portions of the image, or replace all occurrences of one color with another color. Best of all, you can save tools and their settings—foreground color, brush shape, and so on—to a special palette for easy retrieval (see the screen image "Convenience Tools").

BrushStrokes marginally outperforms Expert Color Paint in some areas, but underperforms it in others. For example, BrushStrokes limits its mask layer to a single bit of data per pixel, meaning that the edges of a mask are harsh and jagged instead of antialiased. Meanwhile, Expert Color Paint provides softer paintbrushes and antialiased airbrushes, both of which help to lessen the jags.

BrushStrokes' strong educational component is ideal for anyone new to painting. But with a street price ($95 to $100) that's more than three times the street price of Expert Color Paint, the price for that hand-holding is steep.

Color It 2.0.1

At first glance, Color It's $299.95 price seems excessive, particularly since it jumped from $120 for version 1.0 to its current price without gaining significant new features. In reality, though, Color It



BY DEKE McCLELLAND

costs $82 to $90 through mail order—making it less expensive than BrushStrokes' street price.

Color It is a powerful program, designed for artists who place equal emphasis on image creation and image editing. In addition to letting you paint inside selection outlines, Color It provides an 8-bit mask layer, perfect for merging images and making precise alterations. Color It also provides the ability to selectively revert portions of an image to their appearance when last saved.

Color It offers extensive control over antialiasing and feathering, and its magic-wand tool is second only to Fractal Design Painter's. If you select an area and then adjust the tolerance of the magic wand, Color It updates the selection dynamically; you don't have to start the selection process over as in Expert Color Paint, BrushStrokes, or even Photoshop.

In a way, Color It is the complete opposite of BrushStrokes. Strong on features, Color It is sometimes unnecessarily difficult to learn. Many of its special-effects filters are strangely named and poorly explained in the documentation. The emphasis of the program is also skewed; it doesn't support pressure-sensitive tablets or Photoshop plug-in filters, yet it provides a do-it-yourself filtering command that's well beyond more-savvy programs.

When all is said and done, Color It is about twice the program Expert Color Paint is, for about three times the money; those watching the bottom line might be better off with Expert Color Paint. And with a street price that's about $10 less than BrushStrokes, Color It is clearly a better bargain. If you're hungry for more-powerful image-editing and painting features, though, keep reading.

Fractal Design Painter 2.0

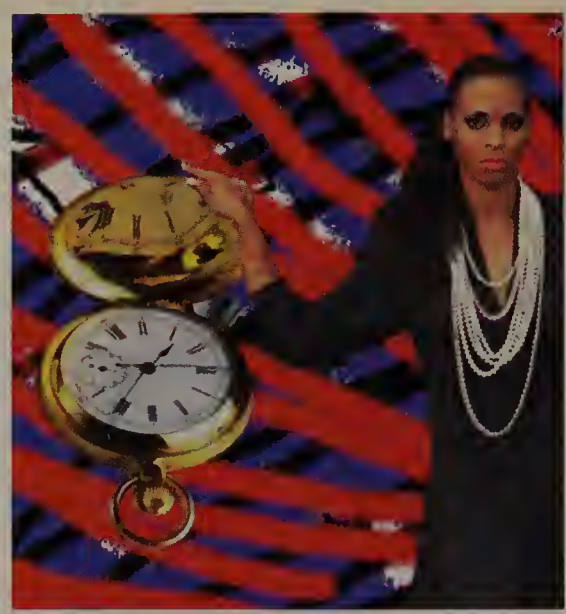
Like Color It, Fractal Design Painter's price has jumped significantly—from $299 for version 1.0 to $399 for the current edition (street price is about $279). But this is one case where the new version is worth the extra money; Painter 2.0 is a significantly revamped program that includes dozens of major new features you simply can't find in any other application.

Painter remains the foremost natural-media painting program on the Mac. Programs like PixelPaint Professional make a stab at real-life brushes, but only Painter goes full tilt, providing more pencils, pastels, crayons, markers, inks, oils, and erasers than you'd have found in Picasso's studio. And Painter 2.0 provides new ways to edit these brushes so you can create tools all your own. For example, you can specify the exact shape of the brush tip and the angle at which the brush meets the canvas.

Painter is the only program that lets you translate pressure of the brush, using a pressure-sensitive tablet, to color intensity, jitteriness, and the degree to which a color bleeds into the fabric of the canvas. Add to this custom lighting and glass-refraction effects borrowed from 3-D rendering programs such as MacRenderMan and Ray Dream Designer, and you have a prodigious tool for creating original artwork on the Mac.

By the time you read this, Painter/X2 will be available, a separate $149 product from Fractal Design that altogether revolutionizes the Mac painting environment (see *Graphics* news, in this issue). In addition to enhancing Painter's performance and remedying a few shortcomings—you can now cancel a special-effects operation, for example—Painter/X2 enables you to structure an image as a collection of independent floating selections, each of which remains utterly discrete until you request otherwise.

Painter 2.0 is a superb tool for the professional artist and the intermediate user with professional ambitions. Though its interface is tremendously dense and bulky, the program is nonetheless incredibly capable. If your intention is to create original artwork from scratch, or to transform a scanned image into a painting, Painter is the best program available at any price.



A

B

C

D

E

Isolated Experiments These screen images demonstrate Painter/X2's ability to isolate individual selections throughout the painting process. After painting behind the independent watch and model images (**A**), I blurred the background (**B**); brought it to the front and made it translucent (**C**); selected the model image, rotated and cloned it (**D**); then selected the watch, rotated it, scaled it, and applied a few special effects (**E**).

Adobe Photoshop 2.5.1

Given Photoshop's renowned image-editing capabilities, it's easy to forget that this program ($895) is a first-rate paint application, too.

Photoshop's QuickMask feature enables novices and hesitant intermediates to painlessly discover the power of a distinct mask layer. While Adobe has all but ignored Photoshop's magic-wand tool since version 1.0, the Bézier-type path tools offer all the point-by-point precision you could want. You can create any size brush, adjust the angle and softness of an elliptical brush tip, and specify the impact of a pressure-sensitive brush to an extent surpassed only by Painter.

Photoshop's color-correction options are second to none, enabling you to graph the brightness of colors on a curve, map colors to different hues and levels of saturation, and edit images in any of several color modes. While lacking Painter's flashy lighting features, Photoshop is the king of filtering effects, permitting you to focus an image, distort it, and create custom effects of your own.

Photoshop's printing capabilities are the standard by which all other Mac programs are judged. In addition to being the only program that permits you to create duotones, tritones, and quadtones, Photoshop lets you control ink coverage, edit color-separation tables, and specify the frequency and shape of halftone cells.

You can speed specific functions using third-party DSP (Digital Signal Processor) boards designed to work with Photoshop. Boards from SuperMac, DayStar Digital, Spectral Innovations, Newer Technology, and others, increase the speed of JPEG operations as well as of focus filters such as gaussian blur and unsharp mask. Because Adobe licenses 300 of Photoshop 2.5's functions to DSP vendors, you can expect future DSP software and hardware to speed transformations, painting operations, and color conversions. Keep in mind, though, that unless your computer has enough memory to edit images without virtual memory—32MB is an absolute minimum—DSP boards will do little to improve Photoshop's performance.

Photoshop's interface is straightforward; even novices can work without getting bogged down by the program's complexity. But with a street price of roughly $550—more than the street prices of Painter, Color It, BrushStrokes, and Expert Color Paint combined—Photo-

Top Paint Programs Compared

	Expert Color Paint 1.0	BrushStrokes 1.0	Color It 2.0.1	Fractal Design Painter 2.0	Adobe Photoshop 2.5.1
General					
Company	Expert Software	Claris Corporation	Timeworks	Fractal Design	Adobe Systems
Phone	305/567-9990	408/727-8227	708/559-1300	408/688-8800	415/961-4400
Toll-free phone	800/759-2562	800/544-8554	800/535-9497	○	800/833-6687
List price	$49.95	$139	$299.95	$399	$895
QuickTime JPEG compression	○	○[1]	●	●	●
Prints color separations	○	○	○	●	●
Virtual memory	●	○	●	●	●
Multiple undos/selective reversion	●/○	●/○	●/●	○/○	○/●
Painting Tools					
Antialiased text and brushstrokes	●	●[2]	●	●	●
Adjust paint opacity	●	●	●	●	●
Pressure-sensitive brushes	○	○	○	●	●
Edit softness and angle of brush tip	○	○	○	●	●
Natural media/custom brushes	○/○	○/○	○/○	●/●	○/●[3]
Selection Capabilities					
Magic-wand selection tool	●	●	●	●	●
Change tolerance dynamically	○	○	●	●	○
Hide marching ants	○	○	○	●	●
Antialias and feather selections	○	○	●	●	●
Selection serves as mask	○	○	●	●	●
Edit mask with paint tools	○	○	●	○[4]	●
Merge floating selections	○	○[5]	●	○[4]	●
Image Editing					
Supports Photoshop plug-in filters	○	●[6]	○	●	●
Paper textures/glass refraction	○/○	○/○	○/○	●/●	●/●[7]
Special lighting effects	○	○	○	●	○
Thumbnail color-correction	○	○	○	○	●
Merge multiple images	○	●	○	○	●

● = yes; ○ = no. [1] Can open only QuickTime JPEG–compressed files. [2] Brushstroke antialiasing available only for paintbrushes. [3] Includes the ability to cut and paste any image as a brush shape. [4] Can do so when used with Painter/X2. [5] You can make floating selection translucent. [6] Photoshop filters must be placed in System Folder or BrushStrokes application folder. [7] Accomplished via displacement maps.

shop demands more than a casual level of commitment.

Peering Ahead

I recommend Painter 2.0 to artists who want to create original images and razzle-dazzle effects, and Photoshop to serious publishers, color-correction experts, and prepress professionals who need a versatile, dependable program.

I may have to change these recommendations in the near future, however. For starters, PixelPaint Professional 3.0—due this fall for $379 from Pixel Resources—looks capable of taking on Painter and Photoshop. The program, which has been in limbo in recent years, will feature a tidy collection of natural-media functions, and improvements to Photoshop's image-editing tools inside a streamlined interface. PixelPaint Pro 3 may reclaim some of the midlevel customers who departed after the disastrous

Convenience Tools In Claris's new paint application, BrushStrokes, you can save a tool and all settings currently associated with it by clicking inside an empty cell in the Tool Settings palette (at right), thereby creating a folded-page icon. To retrieve a tool and its settings later, just click on the corresponding folded-page icon; to delete a saved settings icon, drag it to the Trash Can.

PAINT PROGRAMS THAT NEED A TOUCH-UP

The following programs didn't make the A list, but are summarized here (from least to most expensive) for comparative purposes.

Color MacCheese 2.0.9
Color MacCheese ($99) was the first supercheap, full-color paint program, but it's no longer the cheapest and it offers fewer functions than Expert Color Paint. (Delta Tao Software; 408/730-9336, 800/827-9316.)

DeskPaint 3.5.2
As a black-and-white desk accessory, DeskPaint ($199) was indispensable for creating screen shots and transferring images into Aldus PageMaker. Now that desk accessories are all but forgotten, DeskPaint seems to have lost its place, and it's priced too high to compete. (Zedcor; 602/881-8101, 800/482-4567.)

Monet 2.0
Technically, Monet ($399) is a paint program because it lets you drag brushstrokes across an image. But functionally it's a filtering tool, à la Aldus Gallery Effects. Nonartists will enjoy transforming images into instant impressionistic "masterpieces," but Monet is just a one-trick pony. (Delta Tao Software; 408/730-9336, 800/827-9316.)

Image Assistant 1.1
Its competitor, Photoshop 2.5, is a superior product, so there's no reason to buy Image Assistant ($495) and plenty of reasons to avoid it. You can't antialias type and selection outlines; open PICT files compressed with QuickTime JPEG; change the opacity of a brushstroke in the mask mode; or selectively revert portions of an image to its last saved appearance. (Caere Corporation; 408/395-7000, 800/535-7226.)

Zeus 0.94
Zeus ($499) offers some unique features, but most of its capabilities are confusing and cumbersome. Because Delta Tao considers Zeus a work in progress, the company will provide registered users with free upgrades until the program reaches version 1.0. But I wouldn't get my hopes up. (Delta Tao Software; 408/730-9336, 800/827-9316.)

Studio/32 1.2
I love Studio/32, but a paint program this far behind the times isn't worth $695.95. Its painting and selection tools, which were once the toast of the town, are eclipsed by those available in the more affordable Fractal Design Painter 2.0 and the upcoming PixelPaint Professional 3.0. (Electronic Arts; 415/571-7171, 800/245-4525.)

ColorStudio 1.5
ColorStudio ($795) is currently Photoshop's only serious competition. While ColorStudio—with its high-end color-correction capabilities, professional prepress options, and object-oriented drawing—holds up OK, Photoshop 2.5 simply has the upper hand. But stay tuned—Color Studio version 3.0 is in the works. No details on new features or ship dates were available at press time. (Fractal Design Corporation; 408/688-8800.)

version 2.0, but who now find themselves overwhelmed by Painter's complicated options or Photoshop's depth of capabilities. (A final version of PixelPaint Pro 3 wasn't available for review at press time. For more information, call Pixel Resources at 404/449-4947 or 800/851-1427.)

Meanwhile, Fractal Design's Painter/X2 blows the lid off what we can expect in the future. Before X2, if you wanted to segregate elements of an image for editing, you had to create them in a paint/draw program such as Aldus SuperPaint or Deneba Software's artWorks, both of which lack sufficient high-end functions for painting professionals. Based on the number of paint programs promising capabilities similar to X2's—such as Specular Collage, from Specular International (see *Graphics* news, in this issue)—I'd be very surprised if Photoshop and other programs don't offer independent selections of their own soon.

And while DSP boards speed up Photoshop functions exclusively, that's likely to change, too. More than one vendor within the next year is planning to provide software that speeds up Painter functions. Obviously, this will depend on the perceived demand for such a product. If Painter/X2 takes off, you can count on it.

Speaking of speed, a new technology called Functional Interpolating Transformation System (FITS), developed by Advanced Imaging S.A., a small French company, is on the horizon. FITS enables you to edit and manipulate high-resolution, tabloid-size scanned images on a Mac at speeds rivaling workstations. FITS is the basis of Live Picture, a $5000 application scheduled for U.S. release this summer, and HSC Software plans to incorporate FITS into a future version of Kai's Power Tools. (For more information, see *Macworld News*, August 1993.)

Adding It All Up

If you're a computer artist, you'll likely want to keep close tabs on both Painter and Photoshop in the coming months. If current events are any indication, these two programs will continue to shape professional painting as surely as Adobe Illustrator and Aldus FreeHand have shaped professional illustration. At any rate, get out your beret and put away your easel—the days of sophisticated desktop color painting are here. **m**

With a little luck and some divine intervention, DEKE McCLELLAND'S ridiculously immense *Macworld Photoshop Bible* (IDG Books Worldwide) should be available by the time you read this.

COLOR PAINT PROGRAMS

MW EDITORS' CHOICE

For this roundup of 24-bit color paint programs, *Macworld* looked at 12 contenders. Here are the best of the bunch.

Best Budget Buy

Expert Color Paint This ultra-inexpensive program offers enough capabilities to keep novices sufficiently occupied. **Company:** Expert Software. **List price:** $49.95.

Best Overall Program

Fractal Design Painter 2.0 If you're serious about painting, your best bet is Painter, thanks to its natural-media tools and realistic lighting effects. **Company:** Fractal Design Corporation. **List price:** $399.

Best Image-Editing Program

Adobe Photoshop For image-editing, Photoshop is tops. It's a dependable program with solid painting tools, outstanding color-correction options, and worlds of special-effects capabilities. **Company:** Adobe Systems. **List price:** $895.

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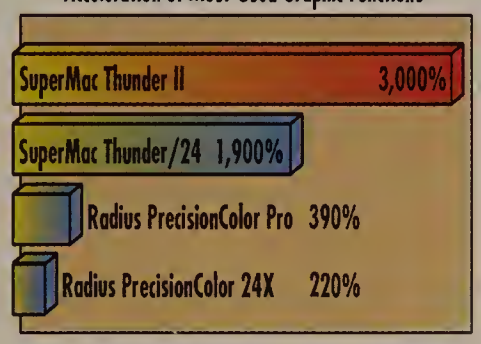

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LOW-COST DRAWING PROGRAMS COMPARED

FINE LINES

BY ERFERT FENTON

You're not a professional artist, but you're not a complete klutz either. Perhaps you want to draw a logo, an organization chart, or some graphics for a presentation or report. You don't want to spend $600 for a high-end illustration package like Aldus FreeHand or Adobe Illustrator; you want something that's more affordable and, with luck, easier to use.

With those requirements in mind, I looked at ten draw applications ranging in price from $50 to $400. The best of the bunch—those programs that offer ease-of-use, attractive pricing, the most useful features, or all of the above—are profiled in this article, beginning with the least expensive programs and moving up in price. Claris's MacDraw II and MacDraw Pro are missing from the lineup, as they will be discontinued this fall in favor of ClarisDraw, a new 24-bit draw program. ClarisDraw wasn't available for review at press time; for more information, see *Graphics* news, this issue. For descriptions of the programs that didn't make the final cut, see "Back to the Drawing Board."

Defining a Draw Program

Draw programs are object-oriented, which means a graphic element such as a line or circle consists of a mathematical formula that describes its shape, size, position, and other attributes. What you see on the screen is merely a visual representation of the object.

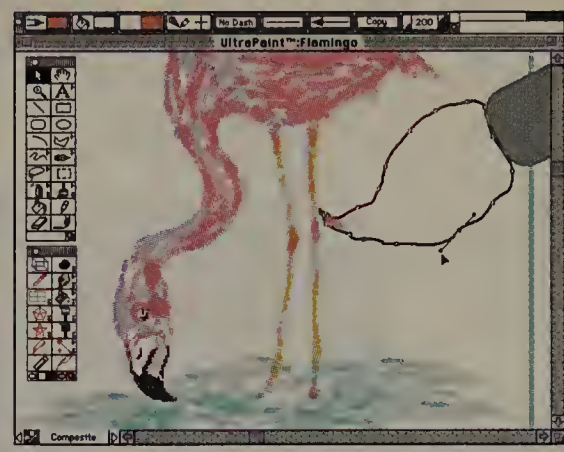
This approach differs from *bitmapped graphics* programs—commonly called paint programs—which render an image as a pattern of dots. In a paint application, the dots you see on the screen *are* the image—the program records the position of each dot. (For a look at paint programs, see "Brilliant Strokes" in this issue.) These days, the lines between draw and paint programs are blurring. Several of the programs reviewed here—among them Deneba Software's Canvas and Aldus SuperPaint—offer both object-oriented and bitmapped graphics tools.

Draw programs share a number of common elements. For example, all provide basic drawing tools: geometric shapes (ovals, rectangles, and rounded-corner rectangles), an arc, a straight line, and a text tool. They also include at least one drawing tool for creating irregular shapes. A polygon tool draws a series of connected lines to form a shape, while a freehand tool generates a continuous line, as if you were drawing with a pen or pencil. In addition, all but one program (Deneba's UltraPaint) supports 24-bit color; most can import and export PICT, TIFF, and EPS file formats.

Six of the programs reviewed offer a *Bézier-curve* tool as well. Bézier curves

CHAN

artWorks Like UltraPaint, Deneba's new artWorks combines drawing and painting tools in a single application. Drawing features include a Bézier-curve tool, used to create the wisps of steam.



UltraPaint Deneba Software's UltraPaint focuses primarily on painting tools, although a Composite layer lets you combine paint and draw tools in the same illustration. Here the flamingo is paint, and the paintbrush is draw.

are composed of straight or curved line segments connected by *anchor points*. You can reshape a curve by moving the anchor points on the curve or by dragging *direction points* located outside the curve.

In addition to letting you create objects, draw programs let you group objects to move and resize them as a unit; align objects in various ways; move them in front of or behind other objects; and change attributes such as line width and fill pattern. Most draw programs let you display dimension lines to measure drawing components, and many offer multiple drawing layers to help you manipulate the numerous objects in complex drawings.

Expert Draw 1.0

Expert Software's Expert Draw is the least expensive addition to the lineup of Mac drawing programs; the suggested retail price is $49.95, although some mail-order houses sell it for $29.95. Expert Draw is based on Michael's Draw (see "Back to the Drawing Board"), but Expert Software has made the Expert Draw manual, user interface, and price more appealing. Expert Draw is also more up-to-date than Michael's Draw, with support for publish-and-subscribe and QuickTime.

Expert Draw offers the basics you'd expect in a draw program, along with more advanced features such as text on a path and blending from one pattern to another. You can take advantage of the program's unlimited overlapping drawing layers for graphics that consist of many components (such as a floor plan), and save drawing elements in object libraries for easy access.

Expert Draw is the best choice for an inexpensive, no-frills drawing application. The program's main drawback is its lack of a Bézier-curve tool. If you need to draw intricate freehand shapes, you'd be better off with a Bézier-endowed program, such as UltraPaint. (For a more detailed look at Expert Draw, see *Reviews*, *Macworld*, August 1993.)

UltraPaint 1.05

UltraPaint ($79) combines paint and draw tools in a single low-priced program. You can create images in a paint layer, as many as seven draw layers, or a composite layer with access to both paint and draw tools.

UltraPaint offers three free-form drawing tools: polygon, free-form shape, and Bézier-curve. The program offers a few unusual features as well, including cube, grid, and star tools. Paint tools include charcoal that works with gray-scale shades; chalk that lays down progressively darker shades of color; a water drop to smooth edges; a calligraphy pen; and even a fountain pen that bleeds.

If you want an inexpensive program that combines paint and draw features, UltraPaint may be what you're looking for. Because it offers both paint and draw capabilities, however, UltraPaint is a bit more difficult to learn than is a draw-only program such as Expert Draw. Expert Draw also has the edge over UltraPaint with its ability to offer unlimited overlapping draw layers and support for 24-bit color (UltraPaint offers only 8-bit color). Neither program, though, offers the clean, streamlined interface that some of the other draw applications do.

artWorks 1.0.1

Deneba's artWorks ($149) is essentially a beefed-up version of UltraPaint that offers enhancements such as unlimited layers, masking, 24-bit color, QuickTime support, object linking, and photo retouching. Drawing features include a Bézier-curve tool that, although better than SuperPaint's freehand drawing tool, is not as good as the Bézier tool found in CA-Cricket Draw III.

artWorks is a decent program, at a reasonable price, but it suffers from the same ease-of-use problems as Deneba's other draw packages, UltraPaint and Canvas. (For more on artWorks, see *Reviews*, *Macworld*, June 1993.)

Aldus SuperPaint 3.0

SuperPaint ($149.95) offers both draw and paint tools in a well-designed, straightforward interface. Unlike some of the other programs, which let you build a drawing out of multiple layers, SuperPaint has only one draw layer and one paint layer; you click on an icon to move from one transparent layer to the other.

BACK TO THE DRAWING BOARD

The following drawing programs didn't offer enough strong features and tools to make the A list, but are summarized here (from least expensive to most expensive) for comparative purposes.

Michael's Draw 1.0 Its advanced text features allow you to attach text to a path, apply a color blend to a word, and fit a block of text into a shape. But the $99 program's poor manual and nonstandard interface make it frustrating to learn. Event One; 408/734-4358.

DeskDraw 3.08 DeskDraw ($199.95, bundled with DeskPaint) has no drawing layers or dimension lines. It offers good color control, however—24-bit color and color settings such as tint, blend, and transparent. If you need a more sophisticated draw/paint package, SuperPaint or artWorks is a better bet. Zedcor; 602/881-8101, 800/482-4567.

ArtBeat Professional 1.0 This $249 program offers pretty basic fare in its drawing and painting layers. The draw layer's tools work fine, but both layers provide disappointments. For example, you can apply only two colors—foreground and background—to any given paint layer, and the Bézier-curve tool is limited. Stay tuned, however; the company is working on an upgrade. Pie Practical Solutions; 201/902-9500, 800/333-2328.

Drawing Comparisons

	Expert Draw 1.0	UltraPaint 1.05	artWorks 1.0.1	Aldus SuperPaint 3.5 [A]	CA-Cricket Draw III 2.0	Aldus IntelliDraw 1.0	Canvas 3.5 [B]
Company	Expert Software	Deneba Software	Deneba Software	Aldus Corporation	Computer Associates International	Aldus Corporation	Deneba Software
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Toll-free phone	800/759-2562	800/622-6827	800/622-6827	○	800/531-5236	○	○
List price	$49.95	$79	$149	$149.95	$249	$299	$399
Drawing Tools							
Number of drawing or painting layers	unlimited	9	unlimited	2	○	unlimited	unlimited
Bézier curve	○	●	●	○ [C]	●	●	●
Join paths/split paths	●/●	●/●	●/●	●/●	●/●	●/●	●/●
Shape tools (in addition to standard)	○	●	●	○ [D]	●	●	●
Bitmap drawing tools	○	●	●	●	○	○	●
Autotrace	○	●	●	●	○	○	●
Dynamically linked objects	○	○	●	○	○	●	●
Object libraries	●	○	○	○	○	○	●
Fills and Outlines							
Gray scale	●	●	●	●	●	●	●
Gradient fill	●	●	●	●	●	●	●
Masks	○	○	●	●	○	●	○
Transfer modes	○	●	●	●	○	○	●
Antialiasing	○	●	●	● [E]	○	○	●
Measurement and Alignment							
Custom-scale rulers	●	○	○	●	●	●	●
Measure distance/area/angle	●/○/●	●/●/○	○/○/○	●/○/●	●/○/●	●/○/○	●/●/●
Effects and Transformations							
Scale by percentage	●	●	●	●	●	●	●
Rotate numerically by degree	●	●	●	●	●	●	●
Skew/distort/change perspective	●/○/○	●/●/●	●/●/●	●/●/●	●/○/○	●/○/○	●/●/●
Blend objects	●	○	●	○	●	●	●
Text							
Manual kerning	●	○	○	○	●	○	●
Text on path	●	○	○	○	●	○	●
Rotate/skew	●/○	●/●	●/●	●/●	●/●	●/●	●/●
Linked columns	○	○	○	○	○	●	●
Display and Output							
Create slide show	○	○	○	○	○	●	●
Color libraries (Pantone/custom)	○/●	○/●	○/●	○/●	●/●	○/●	●/●
Halftones	○	○	○	○	●	○	●
Print color separations	○	○	○	○	●	○	●

● = yes; ○ = no. [A] SuperPaint 3.0 is the version reviewed in the article; version 3.5 wasn't available at press time. [B] Version 3.5 was announced at press time, but was unavailable for review. [C] The freehand tool creates Bézier curves. [D] Can add shapes via plug-in modules. [E] Applied only when graphics are rotated, slanted, or stretched.

The program offers a polygon tool for creating shapes out of straight line-segments, and a freehand drawing tool for creating shapes that combine straight lines and curves. Although the shapes created with the freehand tool are made up of editable Bézier curves, SuperPaint doesn't offer a Bézier-curve tool per se.

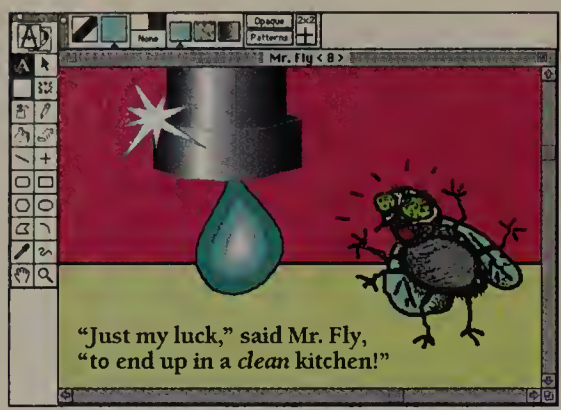
SuperPaint is simple enough that beginners should be able to learn it fairly quickly, but it includes enough sophisticated features to satisfy more-advanced users. The program's not perfect, however; Bézier-curve drawing could use some improvement, and the zoom tool is flawed, giving you an enlarged view of jagged pixels instead of smooth shapes.

SuperPaint 3.5, which wasn't available for review at press time, offers QuickTime compatibility, support for pressure-sensitive graphics tablets, and direct scanner support. The new version should be shipping by the time this article appears in print.

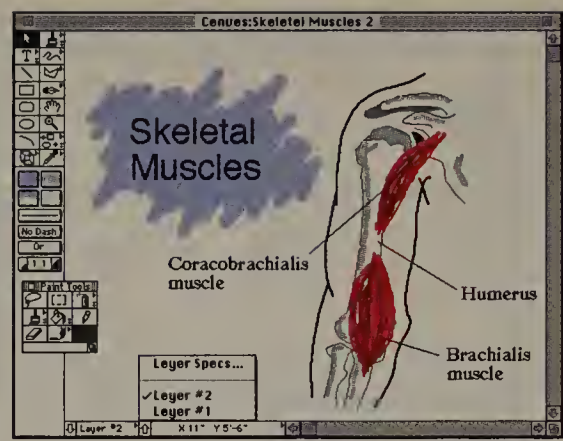
CA-Cricket Draw III 2.0

CA-Cricket Draw III ($249) differs from the other programs reviewed here because every object—even rectangles or circles—can be edited as Bézier curves. In fact, its Bézier tool is one of the best.

The program provides excellent text-handling features. The text editor is like a miniature word processor, offering tabs, justification, and leading, as well as a ruler to set margins. Unfortunately, you have to open the text editor to make changes,



Aldus SuperPaint SuperPaint offers one paint and one draw layer. Here, Mr. Fly was created in the paint layer, and the rest of the elements—including PostScript text and gradient fills—in the draw layer.



Canvas You can use Canvas's layers to manage drawings that consist of many components. In this illustration, the program's freehand and Bézier drawing tools were used to draw the bones, while the muscles were created with the painting tools' brush.

rather than editing the text directly in the drawing window.

If you print color documents, you'll appreciate CA-Cricket Draw's variety of color models, including CMYK and Pantone. Advanced printing options include overprinting and color separations.

While earlier versions of Cricket Draw had enough bugs to justify naming the program after an insect, the current release (version 2.0) is quite stable. And this version offers several new features, including object blends, an extrude tool, and the ability to convert text to outlines.

CA-Cricket Draw III is a solid application for graphic artists and technical illustrators. It's not a good choice if you're Bézier shy, however; those who are new to draw programs would be better off with a simpler application like SuperPaint.

Aldus IntelliDraw 1.0

Billed as "intelligent drawing software," Aldus's IntelliDraw ($299) promises shortcuts and drawing aids for those who aren't experienced artists.

Part of IntelliDraw's intelligence is its ability to link objects, via connector tools, so that changes made to one object affect all linked objects. For example, if you enlarge an object, any other objects linked to it will grow as well. You can also preserve the alignment of a group of objects while you move or resize them.

The program excels in presentation capabilities, letting you create slide shows and flip-book animations. Its ability to link text boxes and reflow text is another plus (although it offers no kerning or text on a path).

Along with standard drawing tools, IntelliDraw offers a few offbeat features such as the Symmetrigon tool, which mirrors one section of an object as you draw to create symmetrical shapes (Symmetrigon, as you'll recall, nearly defeated Godzilla in *Attack of the Object-Oriented Demons*).

If you often work with drawings that have many associated elements (organization charts or floor plans are good examples), you'll appreciate IntelliDraw's linking capabilities. But if you just want a basic drawing application, you'd be better off with a less intelligent—but more straightforward—program. At press time, Aldus was preparing an update of IntelliDraw for fall release. Prices and final features for version 2.0 weren't set as we went to press.

Canvas 3.0

You want features? Deneba's Canvas ($399) has features. This program combines paint and draw tools (including a Bézier-curve tool) with enough text, color, and printing capabilities to satisfy the drawing needs of everyone from technical illustrators to fine artists.

In Canvas you can draw and/or paint in a single layer or a series of overlapping layers. The program offers a respectable selection of precision-drawing tools, including a Smart Mouse feature that constrains cursor movement to your specifications. Like some of the other programs, Canvas has dimension lines for measuring objects, but in addition to distance and angle, Canvas can measure radius, diameter, area, or perimeter. Text handling is ample, with support for kerning, leading, and text on a path.

Deneba should be shipping Canvas 3.5 by the time you read this. New features include text flow between columns; style sheets; support for pressure-sensitive tablets; and faster, more accurate printing on imagesetters.

Feature-laden as it is, Canvas is fairly complicated, especially when compared with bare-bones draw programs like Expert Draw. The Canvas manual spans 900 pages—about the length of *Anna Karenina*, but with more pictures. Although the documentation is pretty good and the program includes tutorials and online help, it takes time to become a proficient Canvas user.

Drawing to a Close

If it's features you want, I recommend Canvas for its extensive set of draw and paint tools. The new version of CA-Cricket Draw III offers an excellent set of drawing tools for the money. SuperPaint boasts an attractive mixture of paint and draw tools, a midrange price, and a tolerable learning curve. While artWorks offers comparable—and in some cases superior—features, SuperPaint is easier to learn and use. As for IntelliDraw, it's not a bad program for beginners, but you should ask yourself whether you want or need dynamically linked objects, one of the program's main selling points. And if you aren't too particular about ease of use, $50 will get you a good set of draw tools with Expert Draw, while $80 will buy you respectable draw and paint tools with UltraPaint. m

ERFERT FENTON is a *Macworld* contributing editor and a weekend artist.

LOW-COST DRAW PROGRAMS

Of the ten draw programs priced under $400 reviewed in this article, four were stand-outs in terms of price and performance. And the winners are:

Best Program for Beginners

Aldus SuperPaint This application offers paint and draw tools in two separate layers. Its relatively simple interface and straightforward manual make it a good choice for novices. **Company:** Aldus Corporation. **List price:** $149.95.

Best Overall Program

Canvas While Canvas is at the high end of the price range, you get a lot of features for the money. It's not easy to master, but beginners can start with basic drawing functions and work their way up to more complex tasks. **Company:** Deneba Software. **List price:** $399.

Best Budget Buys: Draw

Expert Draw If you want a basic set of drawing tools (and can live without a Bézier-curve tool), Expert Draw is your best bet. **Company:** Expert Software. **List price:** $49.95.

Draw/Paint

UltraPaint This inexpensive application combines paint and draw tools, including a Bézier-curve tool, and a few unusual capabilities. **Company:** Deneba Software. **List price:** $79.

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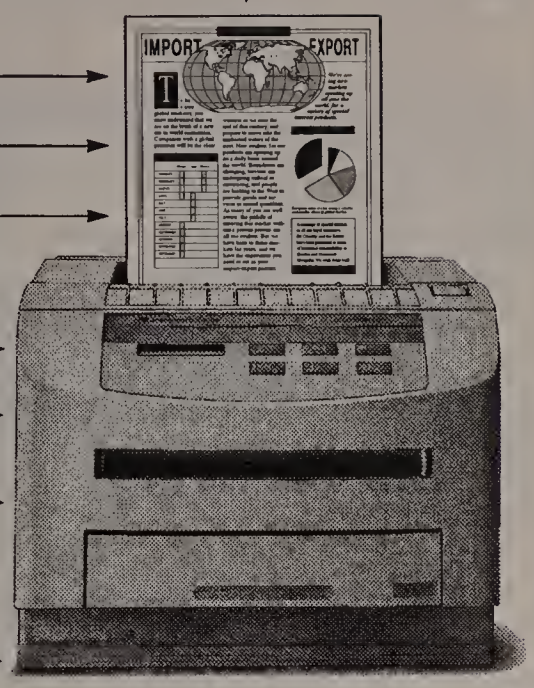

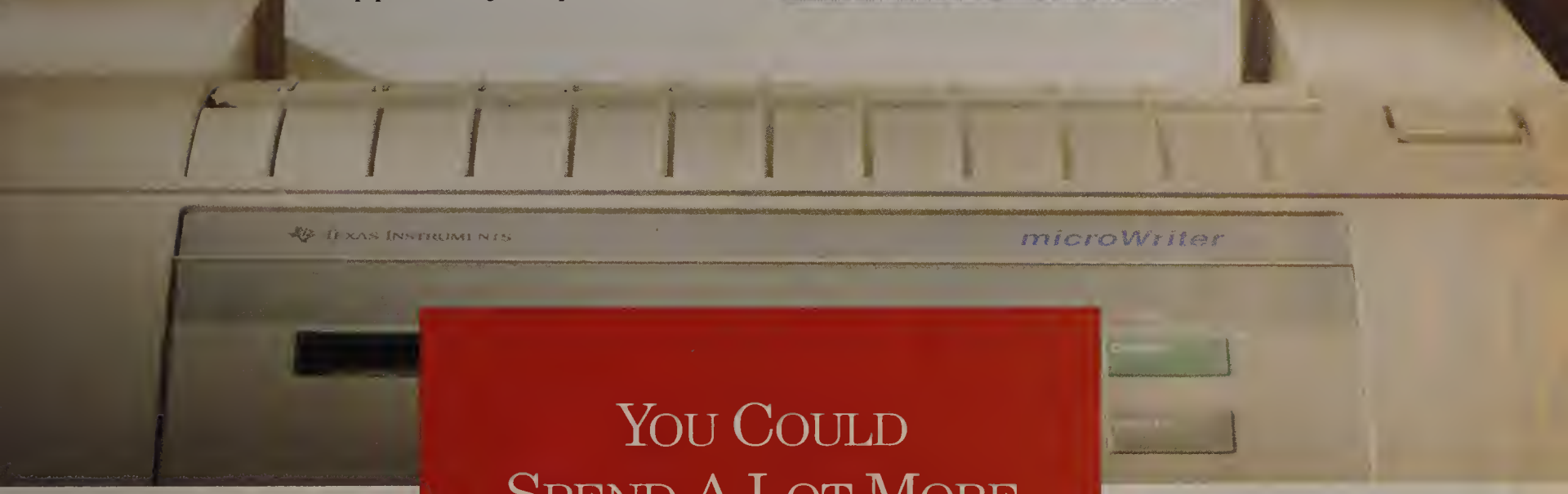

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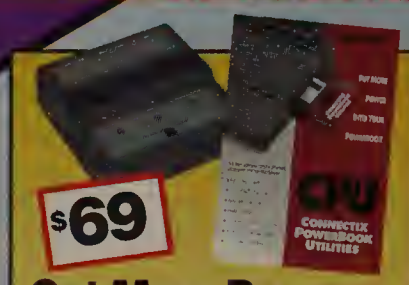

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12272 .....System 7 & Square One 99

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DayMaker 2.0 combines scheduling, to-do lists, calendars, alarms, Gantt charts, and phone and address lists. Send and receive faxes from your PowerBook with the DoveFax PB 96/48 fax /2400 data modem. DoveFax PB allows you to fax without interruption from any Mac application.

12052 DayMaker & DoveFax PB Modem.....125

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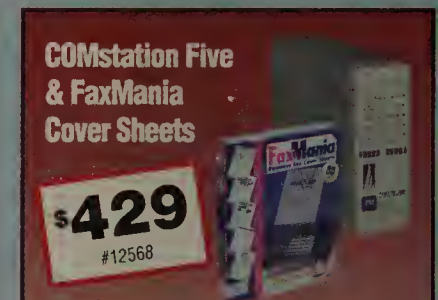
Utilitron's Guaranteed Undelete can put an end to accidental file loss. Inline Design's Redux will make your back-ups a breeze. And Tessarae will let you unwind and have some fun after you secure your data.

12591 .....Guaranteed Undelete, Redux, and Tessarae.....49



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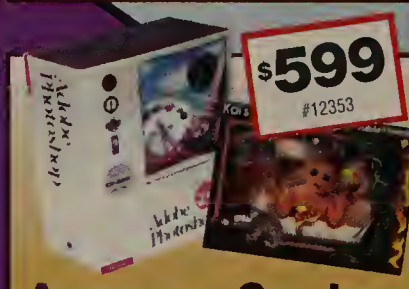

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DELTAPOINT IS UPGRADING DELTAGraph to DG Pro 3.0 with more chart types, more presentation features, scientific data-handling capabilities, a tool bar for commonly used commands, and an "advisor" that suggests chart types and formats.

DG Pro 3.0's new graph types include pictographs (which use stacks of symbols as chart elements), matrix charts, vector charts, and both candlestick and whisker styles of high/low charts, as well as quality-control charts, ternary diagrams, and new types of composite pie charts.

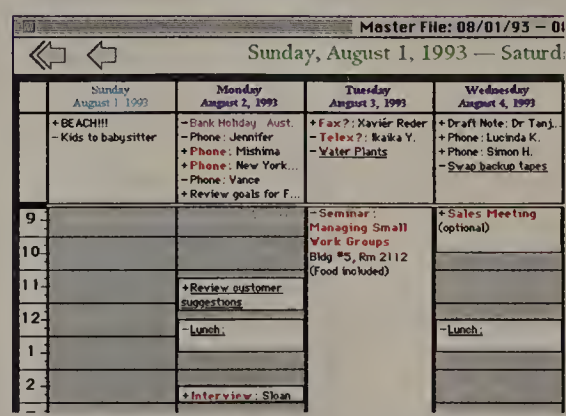
DG Pro 3.0's page-layout templates standardize the format and size of charts throughout a presentation and provide uniform backgrounds and text placement. The format of a whole set of charts can be changed by modifying a template. DeltaPoint has dropped the product's price from $295 to $195, and expects to ship this summer. DeltaPoint, 408/648-4000.—CHARLES SEITER

DAVID BISHOP

Proactive Planning

VISIONARY SOFTWARE'S FIRST THINGS First Proactive adds a striking innovation to the program's calendar and reminder features: an integrated outliner that makes it possible to work out the details of a task as you schedule it. If an outline isn't roomy enough to plan a task, you can attach external documents and open them in their native applications with a mouse-click.

FTF Proactive outlines and schedules can also be linked to other FTF Proactive outlines and schedules. This lets you combine schedules for several networked users in one place to look for possible meeting times, or maintain and coordinate separate calendars for your business, your personal life, and so on. Claris will market FTF under the Clear Choice label; FTF should ship in October. Price was not set at press time. Claris, 408/727-8227.—D.L.



Proactive Planning In First Things First Proactive, scheduled events appear on a calendar, and to-dos are listed above each day.

Shrinking Your Postage Costs

ACCUZIP6 IS DESIGNED TO CUT THE cost of bulk mailings (anything over 200 pieces) by as much as 6 cents per piece for first-class mail and 9.6 cents per piece for third-class mail by correcting addresses; adding zip+4 information, Postnet bar codes, and carrier route codes to addresses; and then sorting addresses before printing labels. The program also has an integrated mailing-list manager.

AccuZip6 eliminates duplicate addresses and ensures accuracy by comparing your database to a bundled CD-ROM containing every deliverable address in the United States. The program presorts

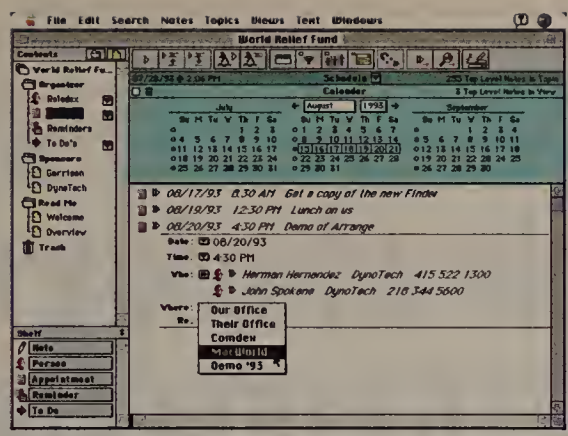
and prints Avery labels for bulk first-, second-, or third-class mail and is CASS-certified (CASS stands for Coding Accuracy Support System) by the U.S. Postal Service.

Version 1.8, which is now shipping, has a much-improved manual, can print sack tags and required USPS paperwork, and now prints on more printers, including the OkiData 590 and 591 high-speed 24-pin printers. AccuZip6 is $899, and CD-ROM updates are available for $200 per quarter. Software Publishers of America, 714/846-1908.—TOM NEGRINO

PIM Construction Set

A NEW COMPANY FOUNDED BY THE folks who brought us FullWrite Professional is hoping to eliminate all barriers between different kinds of information, and plans to start with a construction kit for end-users to create applications that resemble personal information managers.

Common Knowledge's Arrange stores information in different types of notes—outline items, database records, time-bound or date-bound information, and others—and provides tools for creating new note types. Multiple notes can be laid out in a user-designed window, and the notes can also be linked automatically. Arrange uses *agents*, which perform tasks such as noticing someone's name and telephone number in an outline note and adding them to a database note.



PIM Construction Set Any item can be in multiple places on the hierarchical list at left, with different information in each place.

Arrange also has *info drivers*, which understand information in files created by other applications and can import the info into notes. Info drivers are based on a technology that is Common Knowledge's master plan, called TAIL, or The ASCII Interchange Language. TAIL is a high-level description of information that, if Common Knowledge can convince other vendors to adopt it, would allow applications to share files without losing fundamental pieces such as equations in a spreadsheet, layout templates in desktop publishing software, or paths through a hypertext document.

Arrange should ship this summer for less than $200, and will include a dozen PIM templates for architects, salespeople, and other users. Common Knowledge, 415/325-9900.—D.L.

Watching the Markets

TICKERWATCHER MAKES IT POSSIBLE to store and examine information on stocks, bonds, and other securities on your Mac. The new version, TW 6.0, manages up to 10,000 symbols in 255 portfolios; maintains price histories for 300 days (60 weeks); offers a variety of standard chart types used for analyzing securities; and can trigger an alarm when a stock's price or trading activity hits a user-defined level. TW 6.0 also adds a simple scripting language for automating many tasks, and report designs can be named and added to a menu. TickerWatcher is available for $295 from Linn Software, 404/929-8802. For $50 each, Linn also markets utilities for transferring data to Excel and to two technical-securities-analysis packages.

For TW users to obtain raw data, Linn also sells Data Transmission Network's receiving system. DTN's Wall Street data includes news and other information, but securities are delayed 15 minutes. Data Broadcasting's Signal service, available directly from Data Broadcasting, doesn't include news, but provides securities prices in real time. Data prices vary. DTN, 800/485-4000; Data Broadcasting, 415/571-1800.—D.L.

TOM GIBSON

IN BRIEF

■ **New Ultracheap Security** UsrEZ is shipping ultraShield, a security package that has almost all the features of the company's ultraSecure and, at $149, lists for $90 less. Both provide access control, encryption, and virus protection. ultraShield lacks ultraSecure's Double DES encryption and uses 56-bit keys instead of 112-bit keys. UsrEZ, 714/756-5140.

■ **Free DataDesk Upgrade** The statistical-analysis and data-visualization package DataDesk is being upgraded to version 4.1. The new version can create subgroups of a data set; adds several nonparametric tests and new regression features; and provides a notebook interface for keeping track of your work. DataDesk lists for $595; the upgrade, which should ship this summer, is free to version 4.0 registered owners. Data Description, 607/257-1000.

■ **Spreadware's Business Tools** Excel add-on publisher Spreadware is shipping Pro Forma, a tool for generating projected financial statements, and is developing Business Blueprint, a $79 business-plan template that should ship this summer. The $189 Pro Forma provides a choice of several projection types and supports numerous reporting-period schemes. Spreadware, 619/347-2365.

■ **MacProject Pro Supports AppleScript** MacProject Pro 1.5 adds support for AppleScript, and comes with sample scripts for batch-printing and FileMaker integration. The new version also adds a floating button-palette and can open and save files in Microsoft Project's MPX format. MacProject Pro is now shipping and lists for $599; the upgrade from Pro 1.0 is $29. Claris, 408/727-8227.

■ **TreeAge Updates DATA** Decision Analysis by TreeAge (DATA) is being upgraded to version 2.5. The decision-analysis tool (see "Forecasting the Future," in this issue) adds conditional, logical, mathematical, statistical, and other functions; Markov analysis, Bayes' Revision support, and sensitivity-analysis graphs; and publish-and-subscribe support. DATA lists for $297. TreeAge, 617/536-2128.

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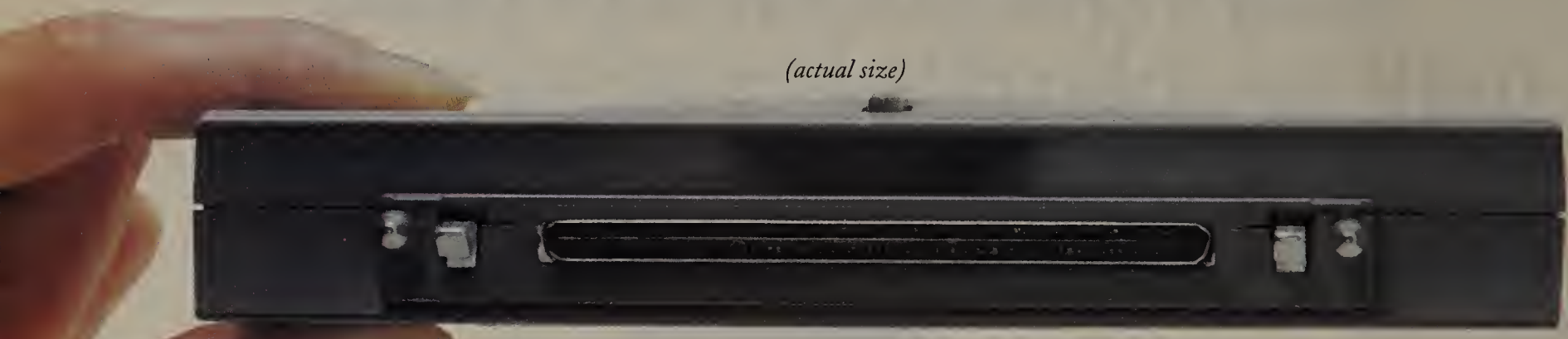

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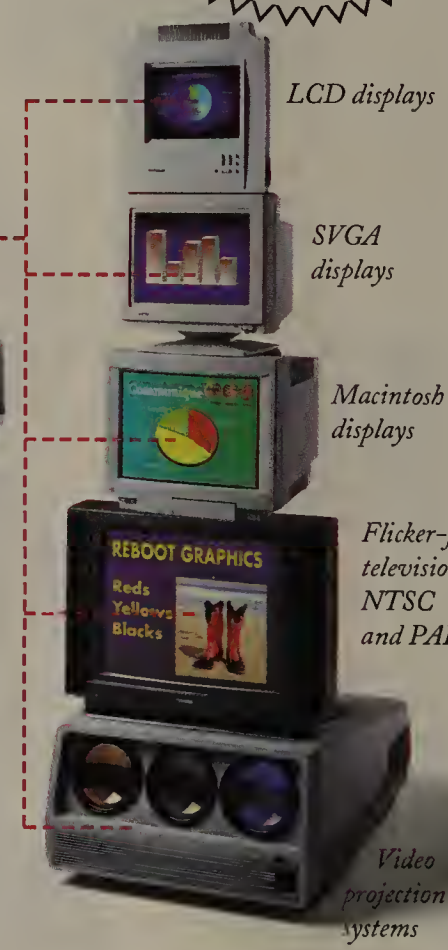

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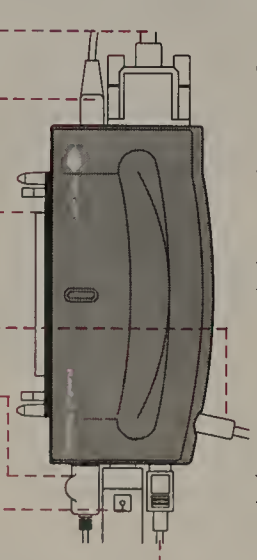

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AT WORK

BY JIM HEID

Working Smart

Managing Excel Spreadsheets

WELCOME TO *MACWORLD*'S NEW BUSINESS-productivity column, *Working Smart*. What kind of name is that? If you aren't working smart, are you working dumb?

Not quite. *Working Smart* assumes you've conquered the basics and goes beyond them to concentrate on the insights that will enable you to better apply the Mac to your work—whether your office overlooks the big city, the backyard, or the back of an airplane seat.

So where to begin a new business-productivity column? With a journey into the Mac's best-known number-cruncher and definitive business tool: Microsoft Excel 4.0. Creating business plans or profit-and-loss statements, taming budgets, analyzing trends and statistics, making graphs, managing data—Excel handles these and innumerable other number-crunching tasks, and not only on the Macintosh but also on DOS PCs running Microsoft Windows. This month, thanks to the guidance of Excel development team member Dan Williams, I'll outline some tips and techniques for managing large worksheets in Excel 4.0, for optimizing Excel's performance, and for creating worksheets and macros that work smoothly on the Mac and under Windows.

Getting Around the Excel Grid

A BLANK EXCEL WORKSHEET LOOKS LIKE an aerial map of a midwestern city. A grid of 16,384 horizontal rows and 256 vertical columns creates a total of 4,194,304 cells. Like a city, a spreadsheet gets hard to navigate as it grows but several Excel features let you create express lanes from one part of a worksheet to another. One technique is to assign descriptive names to cells or ranges of cells. For example, if your worksheet contains a summary section that displays all the bottom-line information, select this section and choose Define Name from the Formula menu. Type a descriptive name such as Summary_Info and then click on OK. (Excel doesn't let you put a space in the name; to simulate one, use the underscore character, shift-hyphen.)

Once you've named a cell or range, you can easily go to that spot. Choose Goto from the Formula menu and double-click on the name. Excel beams you there and selects the cell or range. Excel also remembers your previous four locations and displays them in the Goto dialog box. This streamlines jumping back and forth between various sections of the worksheet.

Faster scrolling is only one reason to assign names to cells or ranges. A bigger payoff is self-documenting formulas. For example, if you've named Deposit and Withdrawal cells, your formula for the Balance cell can read **=Deposit-Withdrawal**. That says more about what the formula does than **=F12-F13**. And the biggest payoff is increased accuracy. It's easy to make a mistake when entering a cell reference —typing, say, **F12** instead of **F13**. But you're unlikely to type **Deposit** when you mean **Withdrawal**.

Excel's range-naming features go much further. With the Formula menu's Create Names and Apply Names commands, you can turn row and column headings into range names and then locate and select rows or columns by specifying those names in various combinations. Better still, you can tell Excel to automatically replace cell references within that range with the appropriate names, yielding clearer formulas. See "Simplifying Data with Excel Ranges" for the details.

Creating Summary Outlines

WHEN A SPREADSHEET REACHES GARgantuan proportions, it becomes difficult to see the forest for the cells. Key figures such as totals get lost in the details, and you end up doing more scrolling and squinting than analyzing.

Excel is the only spreadsheet program with an outlining feature that lets you collapse a spreadsheet to show just the bottom-line results or just the sections you want to concentrate on at the moment.

The Annual Budget sample file included with Excel is a good example. Click on two outlining buttons, and you can completely collapse the spreadsheet to show only the total budget expenditures for each of 5 sites along with a grand total—a total of 12 cells from a model that uses nearly 1000. And by clicking on other outlining buttons, you can zoom in to view, say, each monthly expenditure for each site in each fiscal quarter.

Even better, Excel can automatically create the outline structure for you if you structure the range so that summary values such as totals appear below and to the right of the details. Select the area you want to outline, choose Outline from the Formula menu, and then click on Create. You can even tell Excel to automatically format the totals in bold: In the Outline dialog box, check the Automatic Styles box and then click on Apply Styles. (Tip: If you want to change the way any level of the outline appears, redefine the style for that outline level.)

continues

You can also specify the outline levels manually, by using Excel's Utility tool bar to promote or demote rows and columns. Use this technique when you've structured a range or worksheet in a way that prohibits Excel from deciphering its structure or if you want to set up outline levels before entering data.

Excel Power Tips

Technique	Benefit
Name cells and cell ranges	Faster navigation using Goto command; self-documenting formulas
Create outlines	Collapsed worksheet shows only summary information
Link worksheets	Faster performance, more-efficient memory use; can integrate a group's worksheets
Create workbooks	One-click access to related worksheets, macros, graphs
Zoom out, use multiple windows	Big picture or different parts of a model visible simultaneously
Use Select Special command	Access dependent and precedent cells, find errors in formulas and other problems
Put summary information in lower-right corner	Faster recalc
Use TrueType fonts, DOS-style file names, OLE, =GET.WORKSPACE function	Easier transfer between Mac and Windows

Strength in Numbers: Linking Worksheets

IF YOU ACTUALLY FILLED ALL 4 MILLION cells in a worksheet, you'd be a candidate for a padded cell. Take advantage of Excel's ability to link worksheets instead, by creating a formula in one worksheet that refers to cells in other worksheets.

Linking has several benefits. When you divide a large model across numerous worksheets, the model opens, recalculates, and saves faster than if everything were stored in one worksheet. You can also create different views into the model—create one worksheet containing all the data and formulas, and then link to it separate worksheets that act as reports. You can also use linking to integrate the efforts of a workgroup—each team member contributes his or her worksheet, and you link them to a summary worksheet that presents the key figures from each one.

Linking one worksheet to another is easy. When building a formula, to refer to a cell or range in a different worksheet, bring that worksheet to the front, select the desired cell or range, and switch back to the first worksheet. The resulting formula will contain an *external reference* to the other worksheet. Another way to link two worksheets is with the Copy and Paste Link commands. In the source worksheet, select the cell(s) to which you want to refer and choose Copy. Next, switch to the worksheet where you want to paste the linked data and choose Paste Link from the Edit menu.

To make it easier to open a collection of linked worksheets (as well as unlinked worksheets, charts, and macro sheets), consider binding them into a *workbook*. A workbook document is a digital three-ring binder, a way to transport and work with a collection of related documents. To create a workbook, choose New from the File menu and select the Workbook option. In the workbook window that appears, click on the Add button and then specify the

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Looks like another LaserJet breakthrough for Macintosh

- It's the breakthrough you've been waiting for: the HP LaserJet 4ML. The most affordable LaserJet printer ever made for Macintosh.
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OPTIMIZING PERFORMANCE AND MEMORY

As a model grows, Excel slows. You can optimize Excel's performance and use memory more efficiently by observing a few basic guidelines.

1. Don't format gratuitously. Formatting can take up half the memory and disk space a model uses. If your model requires a large lookup table, put the table in an unformatted worksheet and link other worksheets to it.

2. Don't use formatted macros. You can format for legibility during the design stage, but it gobbles memory. When the macro sheet is debugged and ready to use, choose Select All, then Clear (both from the Edit menu). In the Clear dialog box, double-click on the Formats option to wipe out all formatting. (You might want to save a copy of the formatted macro in a different macro sheet.)

3. Format an entire row or column rather than a large range of cells. When you format an entire row or column, Excel makes an internal notation saying, for example, "Column A is bold." That requires less memory than saying "Cells A1 through A120 are bold."

4. Use Excel's cell style feature. If you want to change the font of all cells in a worksheet, redefine the style named Normal instead of selecting the entire worksheet and then choosing a different font.

5. To add space between rows or columns, adjust their height or width; don't use blank rows and columns. But see guideline 6, below.

6. Don't be afraid to put large blank areas between sections of a worksheet. Excel uses *sparse-matrix memory-management*, which lets it all but ignore large blank areas. But remember that a cell is not considered blank if it contains formatting such as borders or shading.

7. Place summary information in the lower-right corner of the worksheet. Excel recalculates from upper left to lower right, so you'll get faster recalcs if you design accordingly. If you put summary info in the upper-left corner, Excel has to make multiple passes through the model when recalculating.

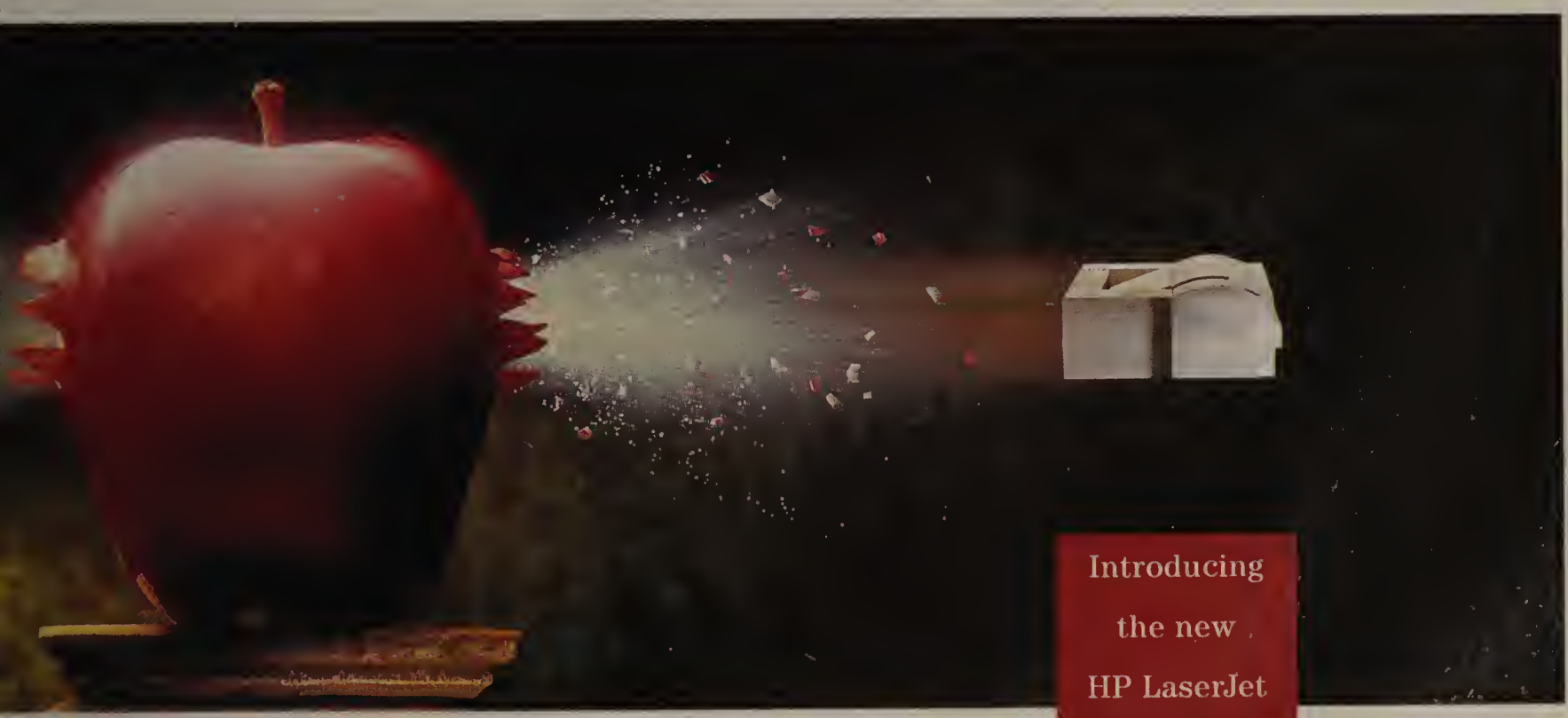
documents you want to bind. Finally, save the workbook. From now on, you can open the files as a group in one fell swoop—simply open the workbook.

Understanding Your Worksheet

A SPREADSHEET THAT YIELDS INACCURATE results is not only worthless, it's dangerous. Modeling gurus refer to the process of proofreading a worksheet and verifying its accuracy as *auditing*. Auditing involves understanding the flow of a model's logic—understanding what its goals are and how it's trying to reach them—so you can verify its calculations.

For verifying accuracy, Excel provides several features that can help you in your journey along the audit trail. One is the Window menu's Zoom command, which lets you zoom out to show more cells in the window. (Zoom in and zoom out are also available on the Utility tool bar.) By zooming out to show the entire worksheet, you get the big picture of how the worksheet is organized—in Microsoft's Dan Williams's words, it's like viewing the worksheet "from 50,000 feet up." By using the Window menu's New Window command along with the Zoom command, you can even create multiple views of a worksheet,

continues



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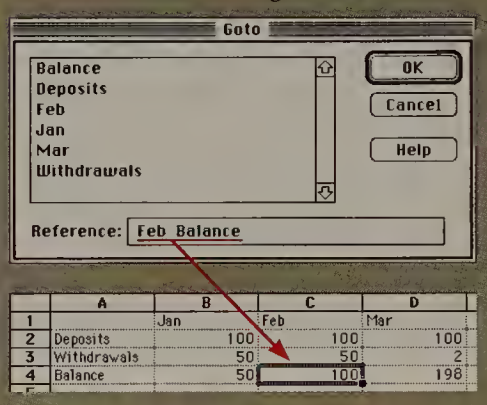
Simplifying Data with Excel Ranges

To clarify the contents of your spreadsheet you can define ranges, or coherent blocks, in your data. First, select the worksheet and choose Create Names and Apply Names from the Formula menu. Excel reads your row and column labels and automatically creates ranges. In the example below it named cells B2 through D2 "Deposits."

	A	B	C	D
1		Jan	Feb	Mar
2	Deposits	100	100	100
3	Withdrawals	50	50	2
4	Balance	50	100	198

The Goto dialog box (accessed from the Formula menu) lists the new ranges. Double-click on a name to select that range on the worksheet. To select range intersections or multiple ranges, type range names with an operator (colon, space, or comma) in the Reference box. For example, typing **Feb Balance** selects the two ranges' intersection.



	A	B	C	D
1		Jan	Feb	Mar
2	Deposits	100	100	100
3	Withdrawals	50	50	2
4	Balance	50	100	198

Typing **Jan,Mar** selects both ranges.

	A	B	C	D
1		Jan	Feb	Mar
2	Deposits	100	100	100
3	Withdrawals	50	50	2
4	Balance	50	100	198

each view showing the worksheet from a different electronic altitude.

If you create multiple windows of a single worksheet, you can set them so that when you scroll one window, the others follow along. Choose Arrange, check the Windows of Active Document box, and then check the Sync Horizontal and/or Sync Vertical boxes.

When you're double-checking to see if a formula is accurate, you often need to refer back to the cells referenced in the formula. Excel makes this easy: just double-click on a cell containing a formula, and Excel selects the cells referenced in the formula. If those cells are in a linked worksheet, Excel even activates that worksheet for you.

One of Excel's most powerful auditing tools is the Formula menu's Select Special command. Say you want to delete a cell but you aren't sure if its contents are needed by other formulas. Select the doomed cell, choose Select Special, select the Dependents option, and click on OK. If the cell is referred to by a different cell's formula, Excel selects the dependent cell. (In the spreadsheet world, a *dependent* is a cell that refers to the active cell; a *precedent* is a cell referred to by the active cell.)

The Select Special command enables you to also locate inconsistencies in rows or columns (the Row Differences and Column Differences options), errors in formulas (the Formula Errors check box), and much more.

Bridging the Mac-PC Gap

MICROSOFT SAYS THAT MOST LARGE firms that use Excel run it both on Macs and under Windows. It's no wonder—the program's interface and file format are the same on both platforms, so exchanging documents and switching between environments is fairly easy. (Excel can even convert a worksheet's custom graphics when you move it from one platform to the other.) There are some potential hurdles, but you can work around them by establishing a few standard practices.

- Use TrueType fonts, provided on both platforms. You'll avoid having to reformat worksheets because one system's fonts aren't available on the other.
- Use DOS-style file names for worksheets created on the Mac. (A DOS file name can have up to eight characters and is followed by a period and a three-character *extension* that identifies the file's type. An Excel for Windows worksheet has the extension .XLW.) To simulate longer names, bind files into a workbook and then use the workbook window's Options button to specify longer, more-descriptive names.
- For worksheets with hot links to other worksheets, use object-linking and embedding (OLE—the Paste Link command) instead of the Mac's publish-and-subscribe commands. Windows supports OLE but, as far as it's concerned, pub-and-sub is a beer-and-sandwich joint.
- In macros, use the =GET WORKSPACE function so the macro can determine which platform it's running on. Then use IF-THEN statements to adjust the macro's workings accordingly.

Excel has far more nooks and crannies than I've had room to explore here, but these tips and techniques should make your time spent with Excel more productive—and more fun. To go deeper into Excel, take a look at John M. Nevison's *Microsoft Excel Spreadsheet Design* (Brady, 1990). Although it doesn't cover the latest version of Excel, it is still a superb primer on spreadsheet design. **m**

Coming Next Month: Power Faxing on the Mac

Contributing editor JIM HEID has been writing about the Mac since its introduction. His latest book, *Macworld Complete Mac Handbook+CD*, has just been published by IDG Books Worldwide.

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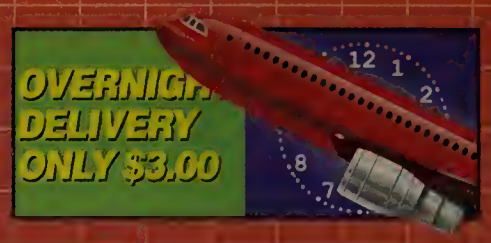

DesignCAD 2D/3D

❼"This is all the capability many designers will ever need. Its price/performance ratio makes it a package we must recommend" *BYTE MAGAZINE*. DesignCAD for the Mac combines both 2D drafting and 3D modeling into one great package. Built from the ground up, not a port-over, DesignCAD offers Floating Point Precision. DesignCAD comes complete with: Isometric, perspective, and orthographic viewing; associative dimensioning; automatic scrolling; tolerance options; arrowhead choices, and much more!

Publisher: American Small Business
CAD0043

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Publisher: Aldus
BUS0299 $89.
Also available:
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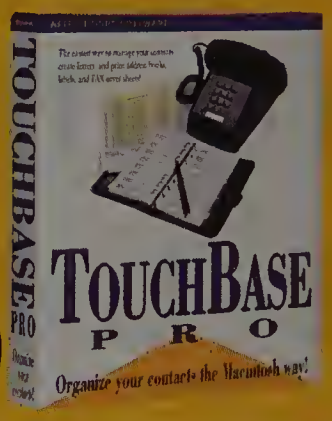
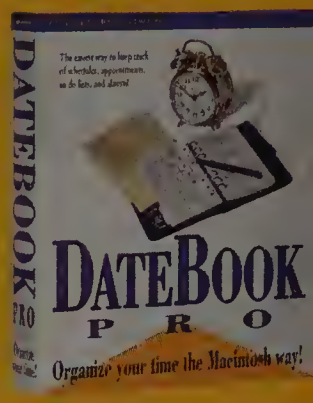
$89





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Blueprint 4*

❼**Blueprint** 4 makes drafting and design easy for architects, engineers and illustrators. The new version 4 incorporates all the professional 2D features found in MiniCad+4. The price/performance ratio is absolutely unheatable. Try it on Manufacturer's 30 day money-back guarantee!

CAD0024 $219*
Publisher: GraphSoft

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❼ASTOUND sets new standards for all presentations! Slides, handouts, static-screen and multimedia presentations are a snap with Astound. Using the familiar "outline and slide" metaphor; combining text, charts, sound, animation and QuickTime is as easy as point and click. Complete with preformatted templates, dozens of transition effects and a wide array of dazzling animated charts. Imports PowerPoint and Persuasion as fully editable files. Freely distributable runtime player for MAC and WINDOWS.

Publisher: Gold Disk
BUS0289

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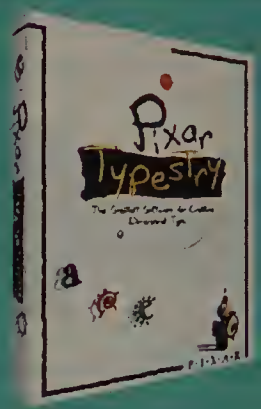
Typestry

❼Pixar Typestry is exciting software which creates dimensional text from Type 1 and TrueType fonts. Move, rotate, scale and extrude words or individual letters and decorate fonts in any number of interesting appearances. Create images for logos, publishing, design, presentation graphics or multimedia. Typestry invokes RenderMan magic to transform a simple word into an extraordinary picture.

Publisher: Pixar
FON0482



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Publisher: Portfolio Software
BUS0277 *Also available:*
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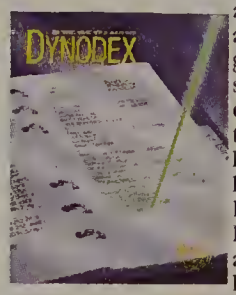
DTP0055 $55



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SoftPC Professional 3.0

❼SoftPC Professional 3.0 emulates an 80286 processor in real and protected mode. It also emulates the companion 8028⁷ math co-processor. In protected mode, it runs applications designed to take advantage of extended DOS memory. Works with SoftNode and includes MS-DOS 5.0, and CD-ROM extensions.

Requires: Any 68020, 68030, or 68040-based Mac with 8MB RAM; 4.7MB RAM for SoftPC; hard disk with 6MB available. 80287 math co-processor requires Mac math co-processor.

Publisher: Insignia Solutions
COM0141

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Fractal Design Painter X2

❼Fractal Design Painter X2, an expert extension to Painter 2.0, revolutionizes the way artists and designers combine and orchestrate multiple graphic elements. With X2 any number of floating selections can be painted into, around or under; they may be scaled, rotated and distorted.

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GRA0412 $279*
Publisher: Fractal Design

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Manufacturer: LB Innovators
ACC0560 WristSaver (Red)
ACC0635 MousePad (Red)
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❼Lots and lots of actual tests, 100's of pages of reports. Spend hours, days, weeks or months practicing, analyzing, and measuring your ability to conquer standardized tests. Score-Rx is the professionally designed program to prepare you the way the test prep courses do.

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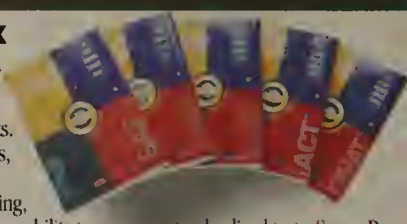

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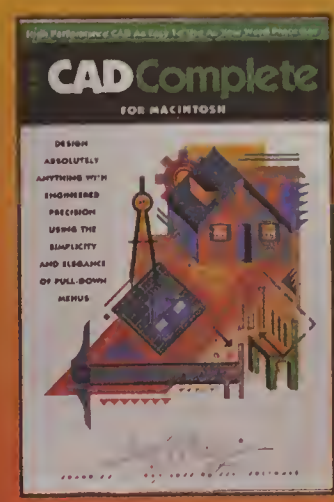

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Publisher: Satori
BUS0317
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❼Is your drive slowly dying out on you? Is that new extension taking more processor power than it deserves? If you use a virus program, you're checking only PART of your machine. MacEKG is a professional diagnostic program that notifies you when your computer's health is below par. MacEKG performs advanced component-level tests to isolate faults and help diagnose intermittent failures. MacEKG learns how your Mac behaves and makes you aware of small problems before they become major catastrophes.
Publisher: MicroMat
UTI0285
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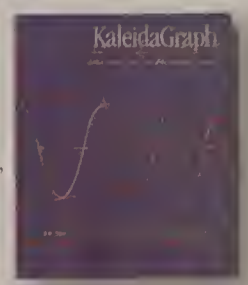
❼Now you can import data, analyze data, and generate high resolution scientific and business graphics from one robust, easy-to-use program. New features include: enhanced interface, Publish, Subscribe and Apple Event support, import Excel files directly, full color support, independent upper and lower error bars, store up to 16 user-defined curve fits for use on a single plot, extrapolate curve fits to the axis limits, and much more.



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❼New release! New SuperPaint 3.5 combines the best of paint and draw packages for anything from the simplest business illustrations to sophisticated full-color art. New features include: Copy Brush, Crop Mark tool, Grid tool, Magic Marker tools, pressure sensitive tools, templates, System 7 savvy. Also: 1 thru 24 bit color, texture, gradients, full color TIFF & EPS graphics support, AutoTrace, Bezier Editing, Arrows, Dashed Lines, Color Balancing, Brightness & Contrast, Masking.

Publisher: Aldus
GRA0503
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Publisher: Image Smith
EDU0417
$45

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❼"It's sleek, fast, and safe. I highly recommend it." *MacUser* review. Protect your hard drive from copying, erasure and unauthorized access (including security bypass with a System diskette). Protect applications, files, and folders (including System Folder) from unauthorized access, deletion, and illegal copying. Deny desktop alterations by unauthorized users. Keep an eye on system usage with FileGuard's User Log which continuously tracks user or group activity. System 7.0 Compatible.
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UTI0135
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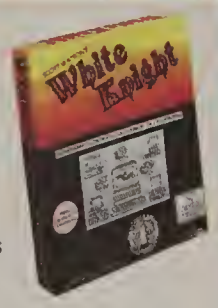

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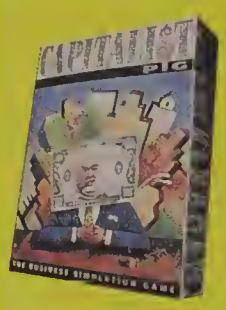

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Retrospect

❼"Retrospect continues to dominate the market for network backup, and for good reason."
MacWEEK, 1992

Diamond Award. Retrospect® 2.0 provides both incremental backup to protect daily work and true archiving to remove inactive files from your hard disk to a storage device. Advanced scripting and scheduling provide automatic, unattended backup to all desktop volumes.

Publisher: Dantz
UTI0227

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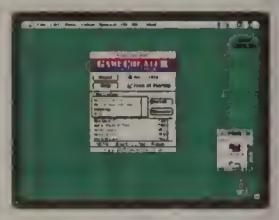

Publisher: Baseline Publishing
ENT0556

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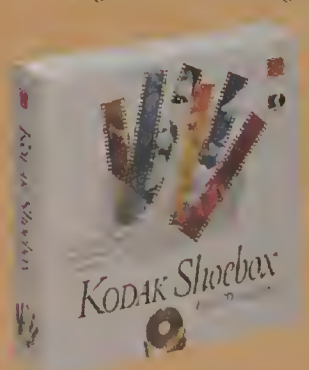

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Forecasting the Futu

FIND YOUR WAY THROUGH THE MAZE OF BUSINESS FORECASTING

Business forecasting is more of an art than a science, and often those called upon to make forecasts have minimal background in statistics. In this article we'll review forecasting concepts and look at principles for picking the right methods and software for your situation.

The big problem in business forecasting is this: sometimes it gives you valuable new information, and sometimes it simply plays back assumptions that you built into your business model. Unless you really understand the math involved in a particular forecasting method, it won't be clear to you which is happening.

Let's begin with a scenario. We'll say that you're a product manager responsible for the success of a new tennis racket, and you need to develop a three-month advertising budget that takes advantage of rising sales but doesn't push you into a loss for the following quarter. You need a sales forecast for the next quarter.

The More Things Change . . .

Every business book with a chapter on forecasting starts with the technique called *regression*, so we will too. If you own a business spreadsheet, you own software that can do the simplest type of regression, *linear regression*. Linear regression analyzes a set of data points to find a line that fits them as snugly as possible, then projects that line beyond the known data set. In "Linear Regressions: Dangerous?" the straight lines were produced using the TREND function on a data range in Microsoft Excel 4.0. (Lotus 1-2-3 and Resolve have similar commands, and every statistics package performs linear regression.) Based on the data in "Linear Regressions: Dangerous?" the line for sales versus time looks like a pretty good prediction, but the data is suspiciously well behaved: though the stock example in most spreadsheet tutorials uses the variables *sales* and *time*, there is usually no underlying relationship between the two.

Here's the problem. When a scientist uses linear regression on experimental data, there's usually a real physical relationship between the two variables—for example, incidence of heart attacks versus serum cholesterol levels, steel hardness versus carbon content, or crop yield versus rainfall. But only in special cases are sales and time linked, cases in which time itself is linked to the real underlying vari-

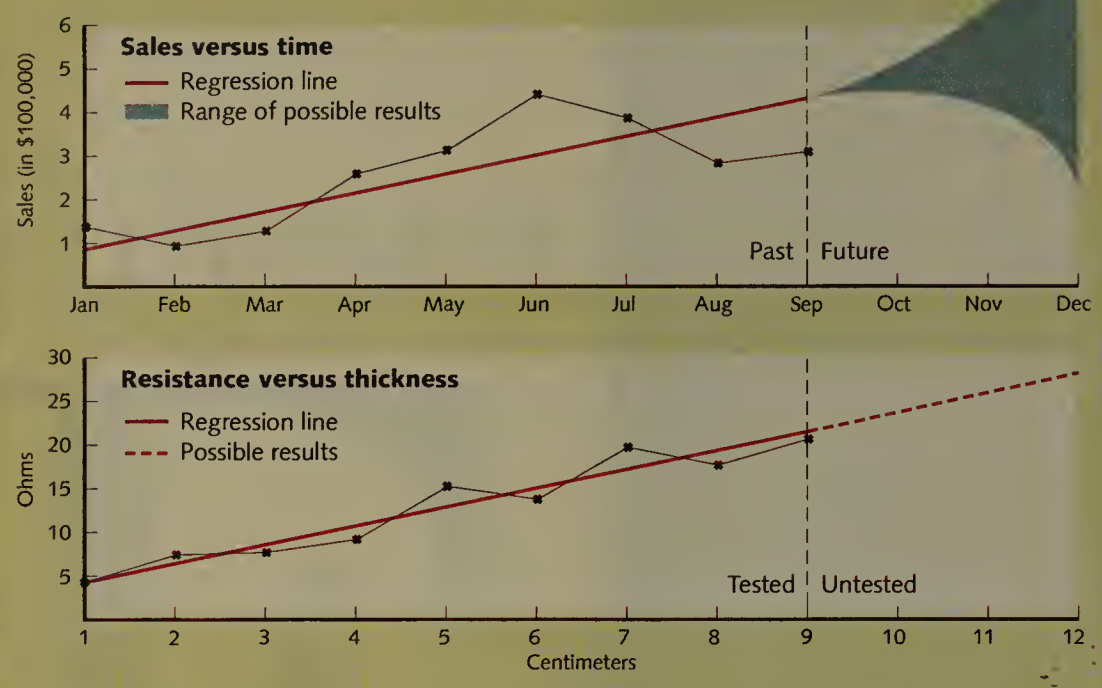
BY CHARLES SEITER

able. An electric utility, for example, might forecast increasing sales of electricity over time, but the real underlying connection is the increasing number of homes and businesses in the utility district. Similarly, it's a fair assumption that sales of your tennis rackets will increase—if you've been ramping up the advertising campaign (at least until the market gets saturated).

And that is the big difference between linear regression in science and in business. You can formulate a linear relationship between rainfall and crop yield, though at some point the relationship will become nonlinear (for example, when the crops drown). But linear regression is nearly the worst way to tell if a market is saturating or if sales are going flat. In a sales-versus-time calculation, regression takes into account the whole sales history, placing little weight on the crucial last few time periods—almost ignoring the latest news.

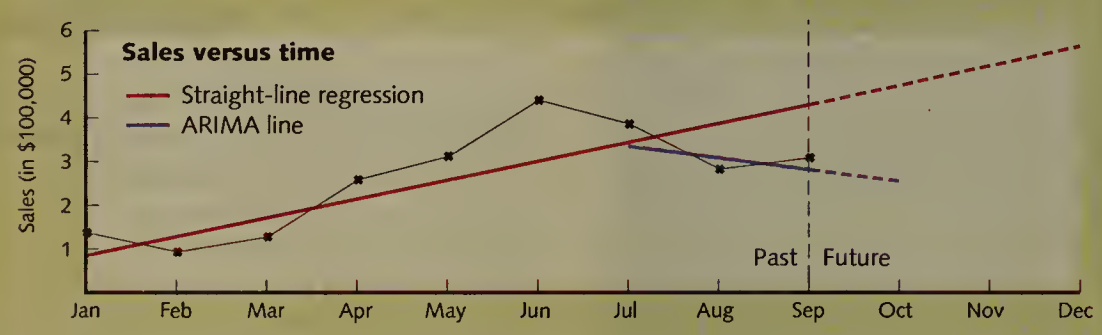
Is regression useless in marketing? Absolutely not, but you have to pick variables that have a real relationship. In our tennis-racket example, you should probably plot sales against advertising, not time. Do

Linear Regressions: Dangerous?



A linear regression can make predictions for you by generating a line through real data points and projecting it out—but a linear regression can also fool you into thinking you know more than you do. These linear regression examples look alike, but they're fundamentally different. The top graph plots sales against time. That relationship is tenuous, and a realistic picture shows a rapidly widening range in which sales for the next few months are likely to fall. The bottom graph compares electrical resistance with the thickness of a block of ceramic oxide. Since these two properties have a true physical relationship, you can have more confidence in the projection.

Short-term versus Long-term Views



You may get a more realistic view of your business if you ignore the long view and focus on the near-term situation. These two plots illustrate the difference between predictions based on long-term results and predictions based on short-term results. A straight-line regression projects steadily rising sales based on year-to-date sales, but the ARIMA analysis, which weights the last three months more heavily, notices the significant downturn in the current quarter.

sales actually increase with increased advertising? Do sales actually correlate with advertising that appeared three months ago? Maybe consumers need some time to decide which racket to buy. These questions can be resolved quickly using simple linear regression on data that should be readily available. Once you understand the relationship between advertising and sales, you're in a better position to estimate the next quarter's profits.

Looking at the Short Term

Linear regression isn't usually the best predictive technique for fast-changing business data, but other time-based forecasting methods may be useful. Most spreadsheet programs offer a command for computing a *moving average*, which smooths out bumps in your data and makes it easier to judge trends. For example, you can average several years of data in three-month chunks, which reduces the amount of noise in your data and usually makes it easier to spot seasonal trends.

With more sophisticated statistics programs, you can call on the *autoregressive integrated moving average*, or *ARIMA*, method. ARIMA combines data-smoothing with regression, and lets you specify just how much smoothing and what kind of regression (straight-line, or, for data with more-complex time changes, polynomial). Most econometric predictions, such as the factory-capacity predictions you see in the financial pages, are based on ARIMA because it is good at picking out both seasonal variations and changes in trends. In effect, the main difference between a straight-line model and ARIMA is really a choice of time scale.

Let's look at an ARIMA example (see "Short-term versus Long-term Views"). Although there's no compelling underlying relationship between sales and time for this case, the example clearly indicates when a real downturn begins. In the same figure, look also at the superimposed linear regression plot. It's obvious which technique provides a more accurate forecast in this case.

This example was originally calculated in SYSTAT, one of the most complete statistics packages. Although SYSTAT offers lots of help, a great manual, and a friendly icon-based interface, using its ARIMA facilities calls for some decision-making on your part; you must specify averaging intervals—in effect, telling SYSTAT how much the past influences the future. In "Short-term versus Long-term Views," the ARIMA computation has been set to think of three months rather than the whole year as a significant interval, so it projects the last two months of downturn in sales as a significant trend. (SYSTAT 5.2 lists for $895 from SYSTAT, 708/864-5670.)

This is useful because you probably already know what the right time interval for your business is. For public utilities the scale is probably years, while for tennis rackets a few months might be appropriate. Other statistics packages, including SPSS and Minitab, offer ARIMA; and Rational Analysis of Time Series (RATS) is a dedicated time-series-analysis product that offers a huge variety of options.

Planning for Uncertainty

Both regression and ARIMA forecasts assume an underlying trend in time-series data. There is another paradigm for forecasting that doesn't consider time at all: a *probability model.*

In this paradigm, you model how much different figures for your business might fluctuate by attaching probability distributions that replace the single numbers in spreadsheet cells (see "Making Smart Guesses"). You could do this manually by creating dozens or hundreds of versions of your worksheet, but Palisade's @Risk and Decisioneering's Crystal Ball 2.0 can automate the process for you. In Crystal Ball, you import an Excel SYLK file and then, for cells whose values you're not sure about, you pick distributions from what looks like a gallery of chart types. In the tennis-racket case, for example, you

would find the cell with the sales you've predicted for three months in the future (based on your sales-versus-advertising data) and give it a distribution instead of a single number. A good choice would be a triangle with the peak—the most likely result—at the value you predicted, and high and low cutoffs based on a best-guess vote by your sales staff. You could construct the same model in @Risk, which installs its own menu in your copy of Excel. @Risk offers a more sophisticated range of distribution options than Crystal Ball, but slightly slower performance.

This probabilistic approach to forecasting has two big advantages over mere number-crunching on past data. First, since it automates so much of the work, you can focus on individual components of aggregate figures (each distributor's sales, for example, instead of total sales). Second, it lets you incorporate your knowledge about the future: your Mac doesn't know when your next product will get to market, but you probably do (give or take a few months).

A probability model may show a wide range of almost equally likely outcomes—one value may turn up as most likely, but the results will often strongly suggest that you'd better allow for plenty of variation. Actually, the difference between the straight-line regression prediction and the ARIMA prediction for the same data set tells you something about this variation, but a probability model shows you the sources of the difference.

At an even higher level of abstraction is the *decision tree*, a diagram of all the steps in a decision with a probability assigned to each. This technique inverts the prediction process. Instead of directly predicting results, you make your best guess about each factor that contributes to a result. Here both the spreadsheet data structure and the factor of time disappear, and you are confronted directly with a diagram that maps the limits of your knowledge. DATA (Decision Analysis by TreeAge) 2.02 carries out this kind of analysis. You incorporate your situation into the tree diagram, and DATA computes the probability of the series of dependent events. The advantage of this approach is that it forces you to critically examine everything about your business, but it's far removed from the spreadsheet-based model familiar to most planners.

Modeling the Process

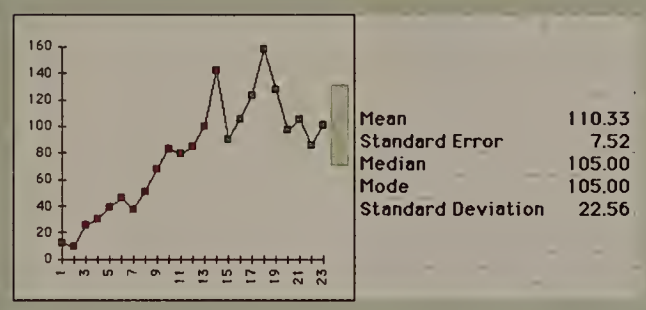
Another approach to prediction, radically different from the methods considered so far, is *process modeling*, or direct modeling of quantities and processes in business. Even simple methods such as regression assume that there's some underlying

MODELING WITH SOFTWARE YOU ALREADY HAVE

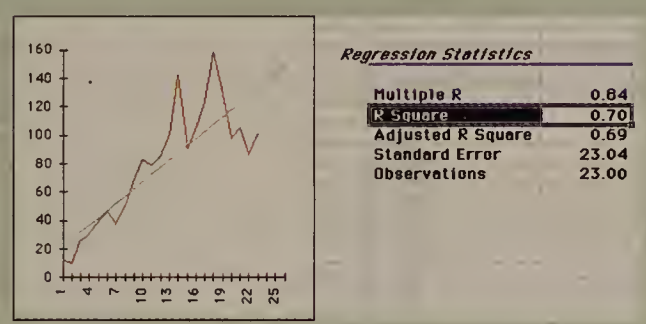
You can use basic spreadsheet functions for simple but realistic forecasting. Practicing with these simple methods will also help you understand what's going on in the specialized packages.

Home on the Range Using tools available in any spreadsheet (even integrated packages), you can calculate a likely range of uncertainty for your prediction. Highlight a data range (take 10 to 20 points as a good sample) and take the standard deviation and mean (average) of the data. As a good first guess, your predicted value for the data for the next few time periods is the mean value, plus or minus one standard deviation—in other words, the uncertainty is about one standard deviation.

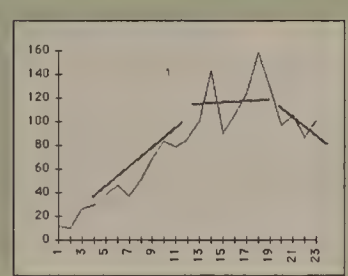
Our simple example, "Standard Deviation," shows a sample sales data set, a plot, and an indication of the predicted future range (it's the green bar). In this analysis, you draw conclusions when you compare the actual results with the range you predicted. For example, if sales drop by more than one standard deviation from the previous mean, you can take it as a warning sign that you have a problem. On the other hand, if they rise past more than one standard deviation, it's a seriously good sign (and probably time to do the computation again). This conservative approach to prediction has the theoretical virtue that it doesn't try to extract any more information from the data than is actually present.



Standard Deviation Green bar at right demarcates one standard deviation in each direction from the mean, an approximate measure of the range of future results.



R Squared With R Squared at 0.70, the regression line doesn't adhere closely enough to the data that you can be confident about its predictions.

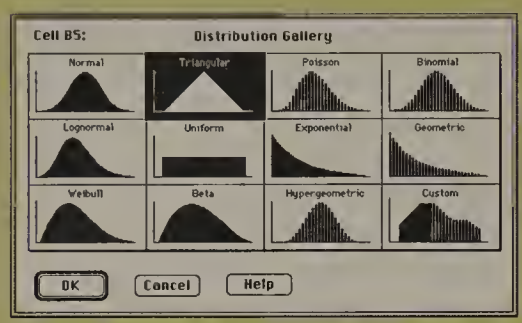


Poor Man's ARIMA By superimposing several graphs of short-term data sets, you can approximate an ARIMA analysis.

Read the Fine Print Spreadsheets will not only fit a straight line through your data points, spreadsheets will also give you a statistical summary of the fitting process. The key element to watch in these summaries is the quantity called *R squared* (see "R Squared"). This number is a measure of the agreement between the fitted line and the original points, and can take values between 0 and 1. If the value is close to 0, your data points are all over the map and there isn't much correlation or trend. At 0.90 or higher, R squared tells you the points really do fit a straight line reasonably well, but for values below 0.80 or so, you're taking chances if you conclude there are trends in your data.

A Little at a Time In a spreadsheet you can get a prediction with much of the same information as an ARIMA calculation by taking small data samples and fitting a straight line through each sample. Using Excel's TREND or LINEST, for example, you can get a set of predicted future time values and then inspect this whole set of points rather than a single prediction (see "Poor Man's ARIMA"). This procedure exaggerates the uncertainty of the prediction (smaller data sets tend to give you lower values of R squared), which probably makes the prediction more realistic.

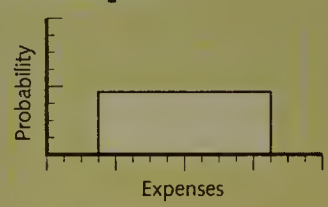
Making Smart Guesses



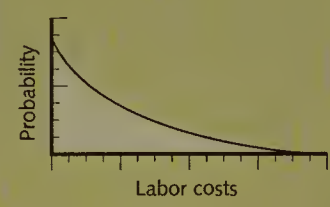
Crystal Ball and @Risk allow you to replace a single value in a spreadsheet cell with a distribution that represents a range of more-likely and less-likely values. The programs then calculate all possible combinations and provide a degree of certainty with the results. (Samples shown are from Crystal Ball's Distribution Gallery.)

Three Distribution Examples

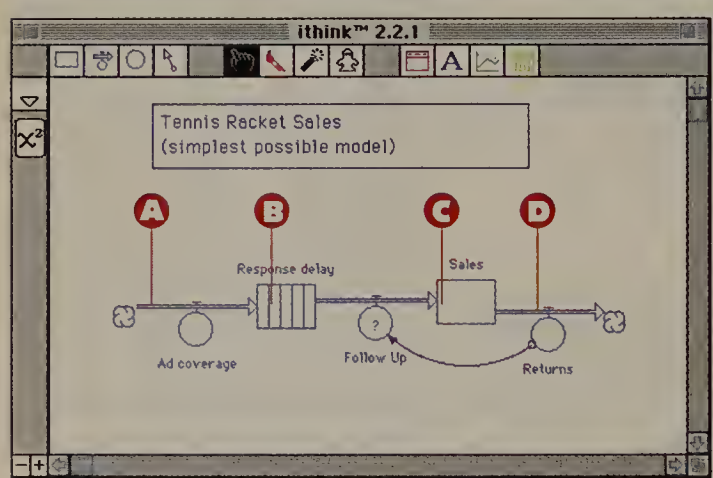
Triangular
You would assign a triangular distribution to a spreadsheet cell if you could make a good guess at the amount and set minimum and maximum cutoffs. For example, you might predict annual sales will be between $600,000 and $800,000 and most likely $700,000.



Uniform
The uniform distribution can be used for cells in your spreadsheet where any amount within a known range is equally likely. For example, if a supplier's bid guarantees you a price range on a key component, you can use a uniform distribution for that cell to estimate manufacturing costs.



Exponential
The exponential distribution is useful to predict how much time passes between recurring events. For example, to estimate how many salespeople you need on the sales floor, you could use the exponential distribution on a cell that predicts how many customers enter your store per hour.



Modeling a Process A simple example of modeling a process with ithink. Advertising is a flow **A**, with a delayed effect (represented by a conveyor belt, **B**). Advertising eventually results in sales, **C**, some of which later must be deducted from sales when products are returned, **D**. Elements can have quantitative relationships—for example, you might estimate that returns will equal 5 percent of sales.

order to a process, even if the assumption is only that things tend to go the way they're going. If you are predicting sales so that you'll know how many new people you can afford to hire, you should probably take into account how much the addition of sales staff will affect sales. The idea behind process modeling like this is that you analyze the flow of cash and other quantities through your business.

It's now easy to assemble this type of model in an icon-based modeling system. Popular examples for the Macintosh are ithink from High Performance Systems and Extend from Imagine That. An ithink model, for example, consists mostly of stocks (like inventory, sales, or personnel) and flows (changes in stocks) represented by icons in a diagram. To make a tennis-racket sales model you would estimate the rate at which advertising dollars convert themselves to sales, introduce a time lag between advertising and sales, consider the sales results of follow-up calls, and define sales as the stock at the end of the process (see "Modeling a Process"). When the model runs, you can see a graph or table of predicted sales or any other factor over time.

This procedure really forces you to think about your operations—if you can't make a plausible guess about how two parts of your business are related, maybe this aspect of your business deserves a little study. Extend, like ithink, uses icon-based diagrams. Extend comes with user-modifiable diagram libraries for different manufacturing and business problems, so for many problems you can start with an existing diagram rather than a blank sheet. Imagine That also sells specialized libraries, and programmers can add specialized knowledge using Extend's C-like ModL language.

Making Sense of Modeling

If you're running a small business, two worthwhile forecasting options are available to you. First, the spreadsheet you're probably using now has built-in linear-regression facilities. As long as you keep an eye on the uncertainty level reported with the results, this simple predictive tool won't get you into too much trouble (see the sidebar, "Modeling with Software You Already Have"). If most of your business decisions concern single-choice propositions (buy or lease, expand or move, build equipment or buy it) the probability modelers that link to spreadsheets are more useful than time-series analysis.

For larger businesses or any business that anticipates regular seasonal changes, ARIMA capability is essential. For large businesses, process-modeling software is a valuable reality check—if you can build a process model that tracks the ARIMA predictions, you have correctly analyzed the most important influences on your business. Mac forecasting software may not always help you see the future exactly, but it offers inexpensive insurance against total surprise and at least gives you the best available basis for planning the future. **m**

In his statistical quality-control consulting practice, CHARLES SEITER, Ph.D., has found that companies need more help with sales forecasting than with QC. He is responsible for developing several "minimal assumptions" forecasting techniques.

WHERE TO BUY

@Risk 1.1 $395; Palisade Corp.; 607/277-8000, fax 607/277-8001

Crystal Ball 2.05 $295; Decisioneering; 303/292-2291, fax 303/534-2118

DATA (Decision Analysis by TreeAge) 2.0 $297; TreeAge Software; 617/536-2128, fax 617/536-2128

Extend 2.0 $695; Imagine That; 408/365-0305

ithink 2.2 $695; High Performance Systems; 603/643-9636, fax 603/643-9502

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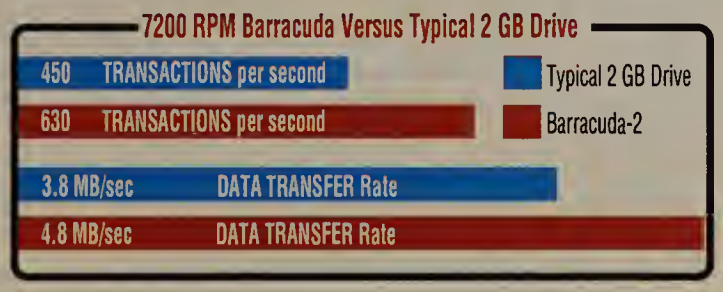

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Circle 43 on reader service card

BY LON POOLE

Quick Tips

Tips, Tricks, and Shortcuts

IF YOU USE SYSTEM 7'S VIRTUAL MEMORY with 32-bit addressing turned off (in the Memory control panel), you can avoid fragmenting memory at the 8MB point by careful placement of multiple NuBus boards, as explained fully in March's *Quick Tips*. To recap, you should install NuBus boards consecutively in the rightmost slots of most Macs that have multiple slots. In contrast you should place NuBus boards in the leftmost slots of a Quadra 700 or 800, Centris 650, IIvx, IIvi, or IIci.

Whoa! Joshua Sarid of Don Mills, Ontario, Canada, wonders whether the IIci shouldn't have NuBus boards in its rightmost slots as recommended by the excellent free booklet *The Macintosh Memory Guide* (Connectix Corporation, 415/571-5100, 800/950-5880). In fact, you can place NuBus boards in either the rightmost or the leftmost slots of a IIci, IIvi, or IIvx if you use the built-in video. On those models the built-in video acts like a NuBus board in a phantom fourth slot adjacent to the three real slots, fragmenting the NuBus slot space used for virtual memory when 32-bit addressing is off. You'll make the fragmentation even worse if you place a single NuBus board in the middle slot. If you don't use the built-in video, you should place NuBus boards in the leftmost slots. Remember, NuBus board placement doesn't matter one iota if you have 32-bit addressing turned on or if you don't use virtual memory.

Custom Start-up Screen

Q. I've noticed my friends' Macs have fancier start-up screens than my plain old "Welcome to Macintosh." How do I change my start-up screen?

Jesse B. Knight
Blue Hill, Maine

A. If your System Folder has a StartupScreen file with a PICT resource of ID 0, the graphic image in that resource replaces the standard start-up screen. You can save a color or black-and-white image in this format with a number of programs, including Canvas 3.0, Capture Utilities (bundled with Capture 4.0), GIFConverter 2.2.10 ($40 shareware by Kevin A. Mitchell, P.O. Box 803066, Chicago, IL 60680-3066), ImageGrabber 3.0, Photoshop (all versions), SuperPaint 3.0, and UltraPaint 1.03.

With a custom start-up screen, your Mac takes longer and requires more memory to start up. A small black-and-white image has the least effect and a large 24-bit color image has the greatest effect.

If your system hangs during start-up, the StartupScreen file is too large. You can try using a smaller image, reducing the color depth (with Canvas, Photoshop, or SuperPaint), or getting more memory (if you have less than 4MB with System 7). If you're using System 6, you may need to increase the size of the system-heap portion of memory with a utility such as Bill Steinberg's free program Bootman (available from online information services and from user groups such as BCS Mac, 617/625-7080, and BMUG, 510/549-2684 or 800/776-2684).

If you have QuickTime installed, you can have a movie play during start-up by naming it Startup Movie and placing it in the System Folder. You can have one or more sounds play during start-up by putting them (or aliases of them) in System 7's Startup Items folder. To halt start-up sounds, press ⌘-period (.).

Changing Memory Sizes

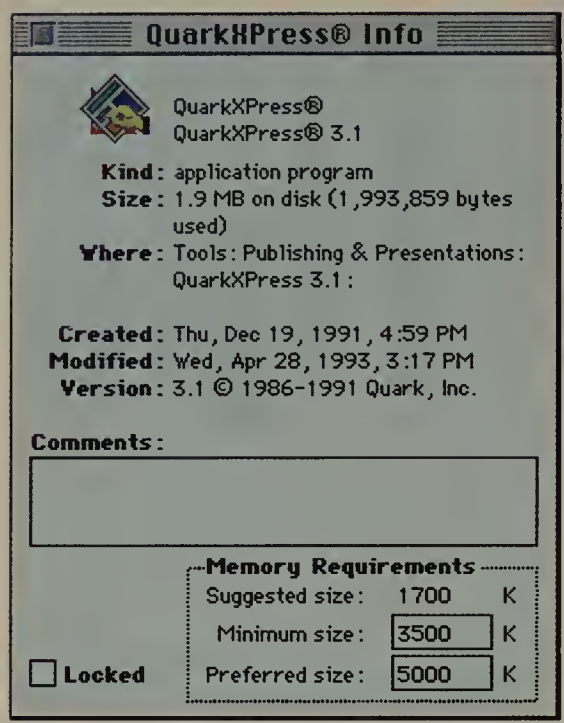
Q. When I try to bring a photo into QuarkXPress from the Kodak Photo CD Sampler CD-ROM on my 8MB Mac IIvx, I get an "out of memory" message. How much memory do I need to perform this task? I thought 8MB was a reasonable amount to start with.

Jacqueline Broner
via CompuServe

A. Although your Mac has 8MB of RAM, neither QuarkXPress nor any other program uses all of it. The system software uses at least 1000K—more with QuickTime 1.5 and the other system extensions required for Photo CD. Each program you open gets a piece of the remaining memory pie. Quark configures QuarkXPress to get 1700K, enough for text and black-and-white photos but not enough for large color photos. Before working with color photos you should increase QuarkXPress's memory size to 3500K or more. The amount of memory the program needs depends on the size of your image files and the overall complexity of your QuarkXPress documents. You change an application program's memory size with the Finder's Get Info command while the program is not open.

Get Info windows in System 7.1 show three memory sizes: Minimum, Preferred,

continues



Memory Sizes The memory sizes in a program's Get Info window—here, QuarkXPress's—determine how much memory the program gets when you open it. With most programs, setting the Minimum and Preferred sizes higher than the Suggested size improves performance or lets you open more files, larger ones, or more complex ones.

and Suggested (see "Memory Sizes"). The system won't open the program unless there is a block of available memory at least as large as the Minimum size. The system allocates more memory, if available, but never more than the Preferred size. The Suggested size, which you can't change, is the amount of memory the program's developer recommends for standard program performance. In versions of system software older than System 7.1, the Preferred size is called the Current size and the Minimum size is not shown. You can set memory sizes only with System 7 or System 6 with MultiFinder active.

StyleWriter II Power

Q. I'm moving to South America and need to know if my StyleWriter II will work with 220V AC power. The manual isn't clear on the subject.

Ricardo Rodríguez
Los Angeles, California

A. Many Apple products have universal, self-adjusting power supplies and need only a plug adapter from Radio Shack or a hardware store to work anywhere in the world. But a StyleWriter II sold in the United States requires 110/120-volt power. To use it with 220V power, you need a good-quality grounded isolation step-down transformer that changes 220V/240V to 110V/120V. Don't use a voltage converter—it will ruin your equipment. If you have an original StyleWriter, either use a transformer or replace the StyleWriter's external power supply with a 220V/240V model.

A transformer does not change the frequency of the electrical current, which is 60Hz in North America and 50Hz in many other parts of the world. The StyleWriter II, StyleWriter, and many other Apple products work on either frequency. A few products should not be used with 50Hz power even with a transformer. "International Power" lists the power requirements of most Apple Mac-related products in use at this writing. For non-Apple hardware (such as hard drives, printers, or monitors), check the nameplate or owner's manual for acceptable voltage and frequency ranges. Most of the single-voltage products are sold outside North America and Japan with 220V/240V power supplies, which require a step-up transformer for use with 110V/120V power.

Your transformer should be rated to handle the total wattage of everything you attach to it and must have a grounded (three-prong) plug. You can order one from Electronics Plus (415/457-0466 or 800/321-4524).

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- **Monitors** High-Res, 12-inch, Portrait, Two-Page Monochrome; 14-inch, 16-inch, 21-inch Color; High-Res RGB
- **Storage Devices** Apple HD20SC, 40SC, 80SC, 160SC; AppleCD SC Plus; Apple CD150, CD300

Single Voltage, Universal Frequency—Use Transformer and Adapter Plug

- **Computers** Mac Classic, Classic II; Performa 200; PowerBook 165c; Mac 128, XL (Lisa), 512K, 512KE, Plus
- **Monitors** 12-inch RGB; Apple Basic Color Monitor
- **Printers** StyleWriter, StyleWriter II; ImageWriter I; Personal LaserWriter LS, NT, NTR, SC; LaserWriter IIf, IIg, IINT, IINTX, IISC; LaserWriter Select 300, 310
- **Storage Devices** AppleCD SC

Single Voltage and Frequency—Foreign Use Not Recommended

- **Monitors** Performa Display, Display Plus
- **Printers** ImageWriter II, LQ; LaserWriter, LaserWriter Plus; LaserWriter Pro 600, 630; Apple Color Printer
- **Scanners** Apple Scanner; Apple OneScanner, Color OneScanner

Detecting Emptiness

TIP Sometimes in FileMaker Pro I need to know if a field is empty. When a Name field is empty, for example, I might use a calculation field to display the reminder message "Please enter a name!" The obvious formula for this calculation field, **=If(Name = "", "Remember to enter a name!", "")**, would not display the reminder message in a new record. When an If function tests for an empty value in a field that has never been given a value (as this example would do in a new record, for instance), FileMaker Pro skips the If function and returns an empty value.

To work around this problem, I create a calculation field called Zero whose value is defined by the formula **=0**. Now I can test for an empty value in the Name field with the formula **=If(Name + Zero = 0, "Name is missing!","")**. There is no need for the Zero field to show up anywhere, so I omit it from my layouts.

David Parillo
Danvers, Massachusetts

If you define a calculation field named Empty with the formula **=""**, then the calculation to test the Name field for an empty value simplifies to **=If(Name = Empty, "Name is missing!","")**.—L.P.

continues

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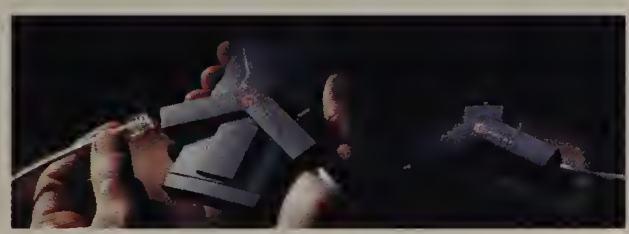

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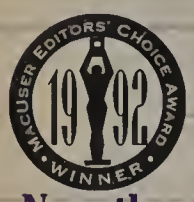

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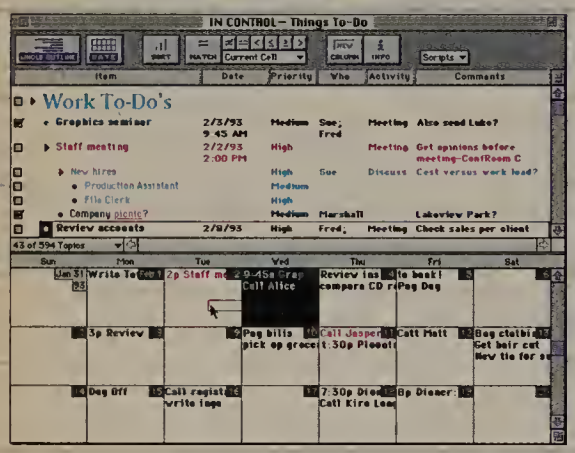

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SCHEDULING ATTENDANCE

Ken Rodd, a day-care center administrator in De Kalb, Illinois, must know how many children to expect at various times each day. He used to write a schedule with a pencil—Johnny attends from 8:30 to noon on Tuesdays and Thursdays; Janie from 9:00 to 2:00 Monday, Tuesday, and Wednesday; and so on. Then he'd write down critical times of the day and count how many children to expect early, midday, and late on each day of the week. Now he tallies enrollment on a Mac SE, using Microsoft Excel's ability to create and calculate data tables. Here's how to compute the number of people scheduled at any specified times on any weekday.

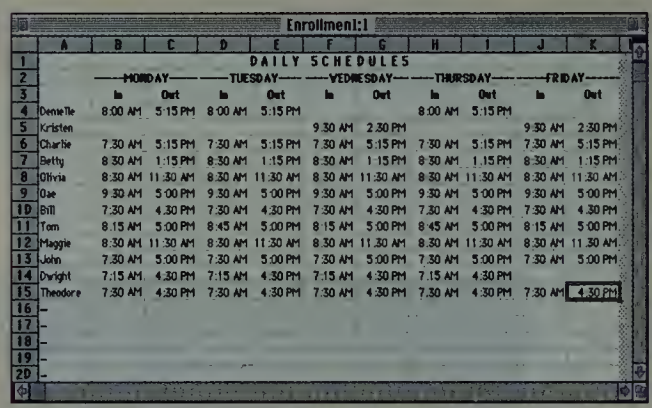
1. List names in column A, one name per row. In columns B through K enter each person's in and out times for each weekday. You can update this whenever schedules change, and you may want to enter placeholders (such as dashes) to reserve rows for future names.

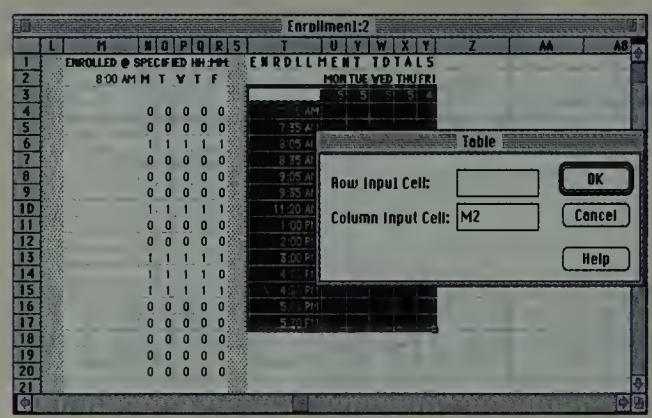
2. Enter the following five formulas, one for each weekday, and then fill down in columns N through R from row 4 to the last row you used in column A (row 20 in this example):

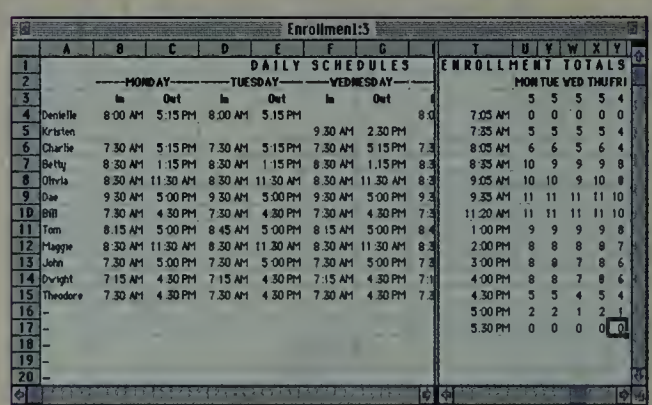
```
N4=IF(B4<(IF($M$2<C4,$M$2,0)),1,0)
O4=IF(D4<(IF($M$2<E4,$M$2,0)),1,0)
P4=IF(F4<(IF($M$2<G4,$M$2,0)),1,0)
Q4=IF(H4<(IF($M$2<I4,$M$2,0)),1,0)
R4=IF(J4<(IF($M$2<K4,$M$2,0)),1,0)
```

These formulas compute whether or not each person is present at a specific time of every day; 0 means a person is not present at the time in cell M2, and 1 means the person is present then. Different times of day to test will be placed in cell M2 by the data table, which you create next.

3. Enter the times at which you wish to know attendance or staffing levels in column T from row 4 down (enter as many times as you like). In cell U4 enter a formula to sum all the rows you used in column N; in the example, the formula is **=SUM(N4:N20).** Fill right from cell U4 through Y4.







4. Now create a one-input data table, in which the values on each line of the table (in columns U through Y) depend on a single input variable (in column T). To do this, first select the range of cells from T4 across to column Y and down to the last row you used in column T (row 17 in this example). Then choose Table from the Data menu; in the dialog box that appears, enter M2 in the Column Input Cell. Click OK to dismiss the dialog box, leaving the Row Input Cell entry blank.

To calculate the data table, Excel inputs the time from cell T4 into cell M2. This causes the formulas in cells N4:R20 to test that time against every person's weekly schedule. Excel sums those results (using the formulas in cells U4:Y4) and places the totals next to T4 in U4:Y4. Excel repeats this process for every row in the data table (rows 4 through 17 in this example). When it finishes, you have a tally of attendance through the week at the times you specified in column T.

continues

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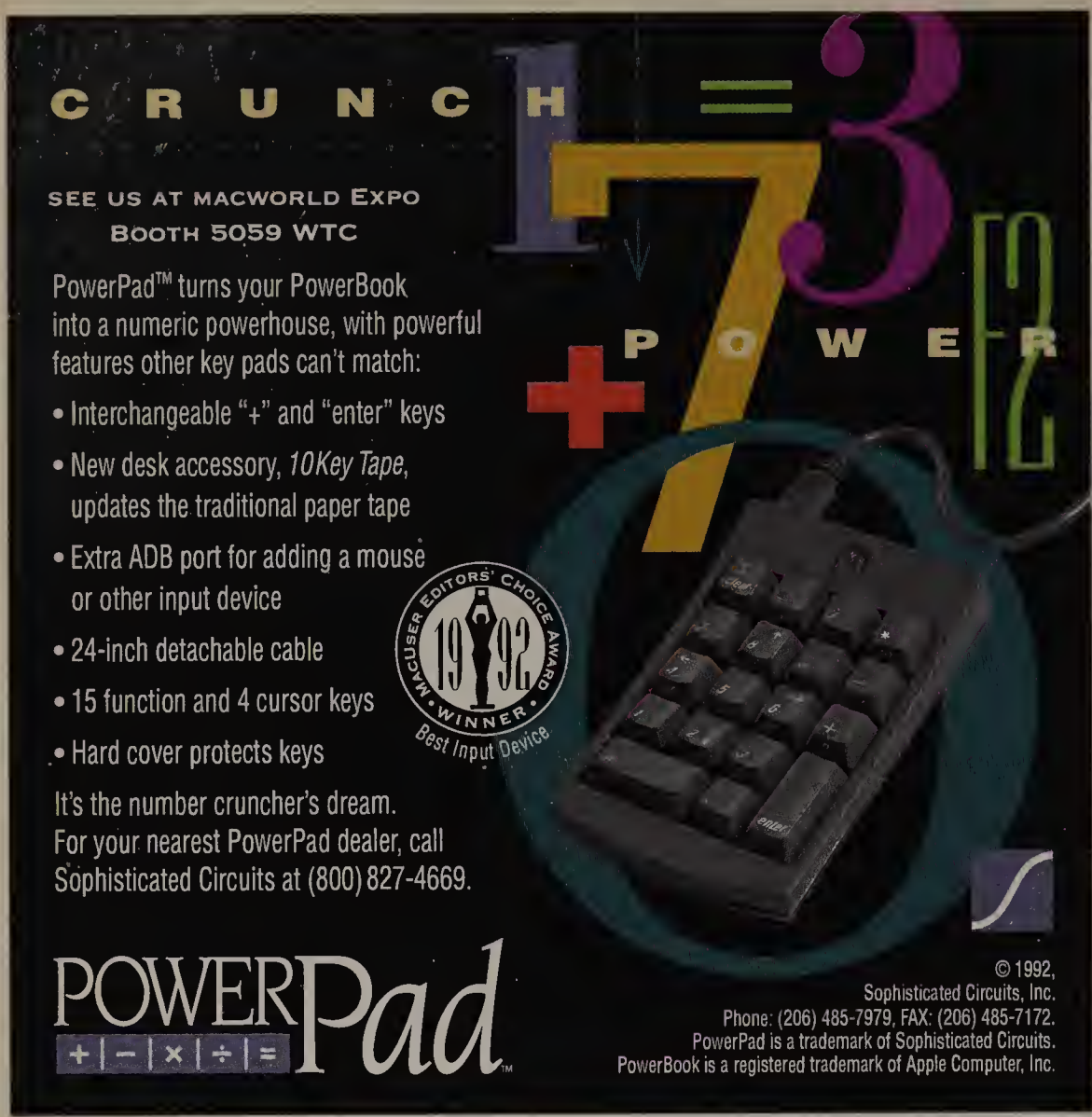
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Remote Control

TIP In graphics programs I often have trouble moving a small object, such as a dot. When I try to drag the object, I inadvertently drag one of its handles instead, stretching the object. To work around this problem, I simply draw a box around the small object and group the two. I can easily drag the box to properly position the small object, and then delete the box.

Ellen Eide
Boston, Massachusetts

Dynamic References

TIP Updating references to tables, figures, bibliographic entries, and so forth can be a real chore in most Mac word processors—even when you use a replace command. System 7's publish-and-subscribe capability can keep table numbers and other references current automatically. The references can be in the same documents as the referents or in different documents. You simply publish the number, name, title, or other identifier of each referent as a separate edition, and subscribe to the appropriate edition wherever you want to make a reference. In Microsoft Word 5.1 (and earlier versions), for example, you select a table number where it appears next to the table and use the Create Publisher command to save the table number as a new edition. Then with the Subscribe To command you subscribe to that edition wherever you want a reference to the table. If you subsequently change the table number (the publisher), System 7 propagates the change among all references to the table (subscribers).

Maarten Vrakking
Delft, The Netherlands

System 7 doesn't normally notify subscribers (the references) about an update until you save the document containing the publisher (the referent). In Word you can have the update occur when you make changes by selecting the Publisher and turning on the Send Edition When Edited option of the Publisher Options command.—L.P. m

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Guide to System 7.1* (IDG Books Worldwide, 1992).

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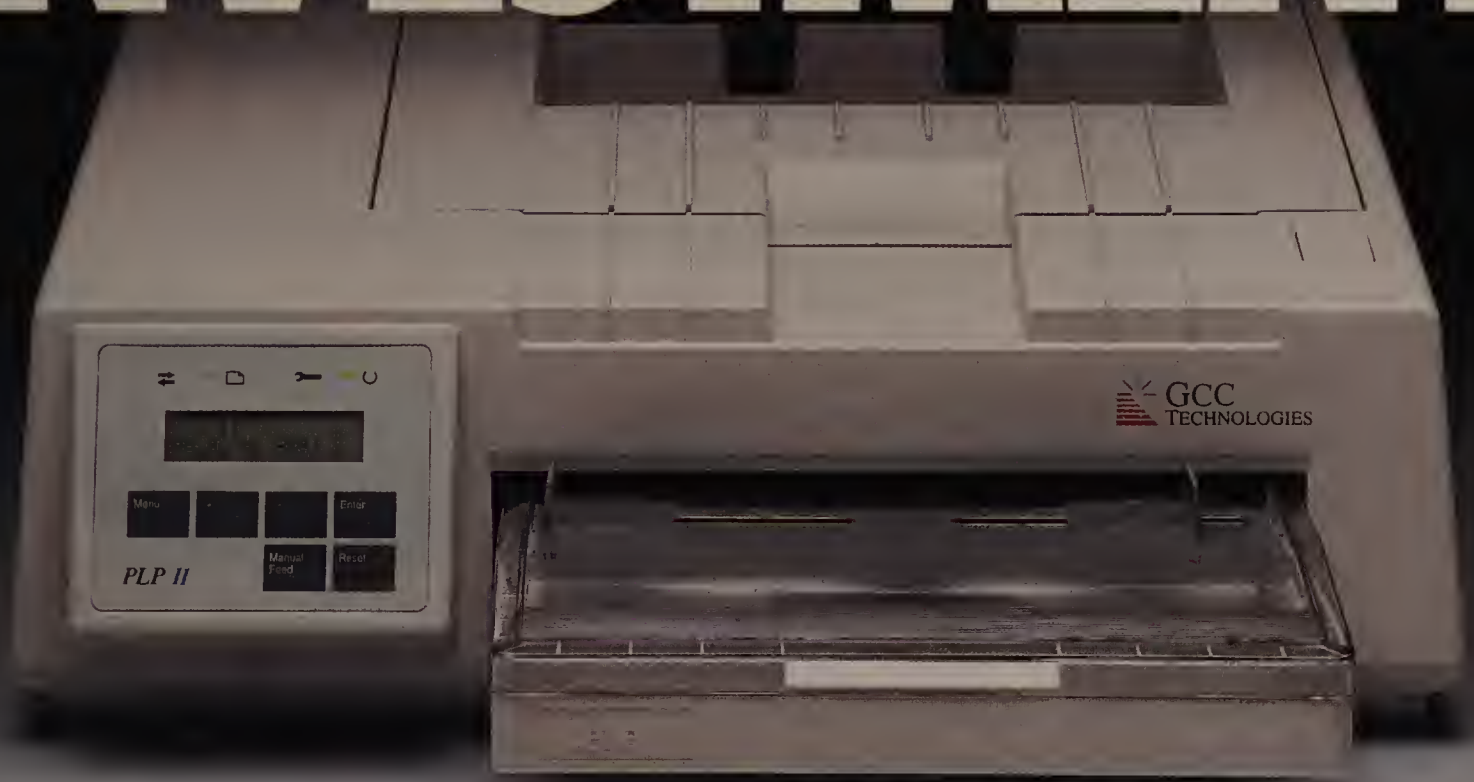

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EDITED BY ELIZABETH DOUGHERTY

Networks

THE LATEST IN CONNECTIVITY AND COMMUNICATIONS

NetWare for Mac 4.0: Missing Pieces

THE BIGGEST NEWS ABOUT NETWARE for Macintosh 4.0 is what's missing. The Mac extension to Novell's network-operating system for Intel-based PCs includes a number of improvements but still doesn't make Macs equal partners with other NetWare 4.0 clients, such as DOS and Windows machines.

The AppleTalk-based NetWare for Mac doesn't offer Mac clients access to NetWare 4.0's raison d'être: global directory services. The extension also excludes Mac clients from some administration tasks, server mirroring, and RSA encryption features.

Despite shortcomings, NetWare for Macintosh 4.0 does offer some improvements. The software lets Macs share a CD-ROM drive attached to a NetWare server. NetWare Tools 1.0, which features overhauled interfaces, replaces the old NetWare Control Center and Desk Accessory utilities.

The utilities also let you match common DOS and Windows file-name extensions with Mac applications so that you can double-click to open DOS files with those extensions.

The software upgrade ties Macs more tightly into Novell's printing services. For instance, under NetWare for Mac 4.0, an AppleTalk printer can accept jobs from multiple NetWare queues and can be assigned to queues that include printers attached to non-Macintosh clients.

Network administrators will also be able to restrict particular Macintoshes from access to the NetWare server based on physical addresses. A new utility that runs on the server offers AppleTalk Filing Protocol (AFP) server administration.

NetWare for Mac 4.0 offers better password-error reporting and a more exact mapping of file security between AFP and NetWare. Files stored on the server now are subject to the security restrictions of the folder in which they are stored, closing a security loophole of past versions. Novell is shipping sample 5-user packs free to registered NetWare 4.0 owners, but sells only $1195, 1000-user packs.

Early next year, Novell plans to offer client software that integrates NetWare protocols with the Mac interface so Macintosh users can gain direct access to NetWare services the same way DOS and Windows users do today. That would mean that no NetWare features would be off limits to Macs. The forthcoming client, called NetWare Systems Services for the Macintosh, will first support IPX (Novell's transport protocol) and then AppleTalk. Novell, 801/429-7000.

—MARGIE WYLIE

ANDREW FAULKNER

Network Debuggers Made Easy

THE AG GROUP HAS DESIGNED ITS SECOND-generation network debuggers to be simple enough for the hexidecimally challenged yet capable enough for the seven-layer enlightened.

EtherPeek 2.0 ($795 list) and LocalPeek 2.0 ($495) are network protocol analyzers, programs that sample and sift network traffic to isolate bugaboos. Now these debuggers are smarter and more flexible, making sifting packets (the basic units of network traffic) less labor-inten-

sive. For instance, the analyzers can detect and follow the thread of a network conversation, like that between a printer and server, or they can automatically find every similar captured packet. They can now sift data as it is captured, enabling you to layer or remove filters at any time. They can generate filters based on any captured packet and come with hundreds of predefined filters.

The AG Group's NetWatchman 2.0 ($295), an early-warning system, alerts you when network devices fail. This software has been fine-tuned to support larger networks by polling AppleTalk zones faster, by letting administrators control the time and frequency of checking the network, and by scanning up to 1000 nodes and 4000 services. The AG Group, 510/937-7900.—MARGIE WYLIE

Portables' Party Line

BY EARLY NEXT YEAR, POWERBOOKS and portable DOS PCs will be able to share a pool of modems through one remote-access server when they dial into their home networks.

Apple and Shiva Corporation are developing a version of AppleTalk Remote Access (ARA)—the protocol that Macs use to access network services over telephone lines—that can share line space with protocols used by other computers, such as DOS PCs and Unix workstations.

Technically the new ARA will run on a standard lower-level protocol, called Point-to-Point Protocol (PPP), but Macintosh users won't see any difference between the PPP-based ARA and what they have now.

Because PPP isn't tied to any particular brand of network, it will allow remote-access servers currently dedicated to the service of AppleTalk networks to be used by Novell NetWare clients (through IPX) or Unix users (through TCP/IP).

Apple says it will offer a PPP-based client to its AppleTalk Remote Access software by late this year. That's when Apple will also release the information that third-party developers need to start making the multiprotocol remote access servers.

Shiva hopes to have a PPP-based server that will be able to accept calls from IPX, TCP/IP, and AppleTalk clients by early next year. Prices were not available at press time. Apple Computer, 408/996-1010; Shiva, 617/252-6300. —MARGIE WYLIE

GraceLAN Manager Update

GRACELAN NETWORK MANAGER 3.0 from TechWorks lets network managers get more information about their AppleTalk nodes, get it faster, and view it in more ways than previous versions.

Network managers can now customize views of network information and limit a scan, to hardware information, for example. A new document capability lets users schedule scans, save gathered information within the program itself, see results of previous network scans, and lay out or print custom reports. A browser lets users scan in real time.

While Network Manager 3.0 runs over AppleTalk, its architecture will support responders (client software) for other platforms and protocols as they become available from GraceLAN and third-party vendors without requiring any change to the console software. GraceLAN Network Manager 3.0 costs $795.

TechWorks also now sells GraceLAN Server Manager, software developed by Santorini Consulting and Design for managing AppleShare servers remotely. GraceLAN Server Manager costs $395 for one server, $695 for five servers, and $995 for ten servers. TechWorks, 512/794-8533.—MARTHA STRYZICH

IN BRIEF

■ **Vital Library** Apple's client/server cookbooks are finally available. The $1500, six-volume set outlines the VITAL (Virtual Integrated Technical Architecture Lifecycle) guidelines. 800/795-1000.

■ **Antipiracy Alert** AppleShare 4.0 enforces software licensing by pestering the pirates. The new server can't be stopped from scanning for illicit copies of the server software on start-up, flooding managers and users with annoying warnings. It may also annoy the honest, since it takes hours to scan a network with hundreds of zones.

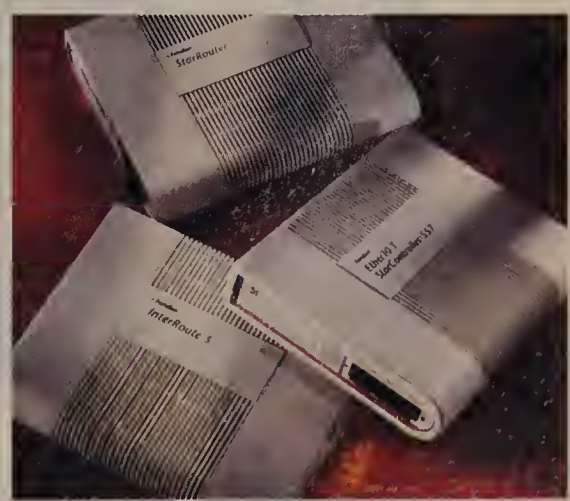
■ **More Database Connectivity** Data Access Language (DAL), Apple's scheme for getting data off mainframes and onto Macs, now supports TCP/IP in versions of the DAL server software MVS, AS/400, and VAX/VMS servers. Apple also is now shipping a developer's kit for Microsoft's competing Open Database Connectivity (ODBC) scheme. 408/862-3385.

Farallon Supports AURP

FARALLON COMPUTING HAS ADDED support for Apple's AppleTalk Update Routing Protocol (AURP) and the Simple Network Management Protocol (SNMP) over AppleTalk to its InterRoute/5 and StarRouter LocalTalk-to-Ethernet router/gateways, scheduled to ship in August. Farallon is the first company to announce hardware supporting AURP, Apple's protocol for tunneling AppleTalk packets over wide-area TCP/IP networks. (Apple implemented AURP in its software router, Apple Internet Router 3.0; see "Rating Routers," *Macworld*, July 1993.)

If you already own one of these Farallon routers, you can get the AURP and additional SNMP support by upgrading your Farallon StarCommand management software to version 3.2, available free from Farallon or electronic bulletin boards.

Farallon's Ether10-T StarController/557, a new 12-port 10BaseT hub ($1799), can also be managed using SNMP over AppleTalk or TCP/IP. InterRoute/5 has a list price of $3499, and the StarRouter lists for $3299. The hub and the routers are available as hub modules for the Farallon Concentrator; each module for the Concentrator lists for $200 less than the corresponding standalone price. Farallon Computing, 510/814-5100.—NANCY E. DUNN



ROBERT PERRY

Farallon's routers, the StarRouter (top left) and the InterRoute/5 (bottom left), and hub, the Ether10-T StarController/557 (right), support SNMP and AURP protocols.

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CONNECTING TO

FOUR WAYS TO INTEGRATE MACS INTO A NETWARE NETWORK

Basically, you're a good corporate citizen. You sponsor at least one coworker for every hour that he or she dances, walks, bikes, or bowls in the name of charity. You sort through paper and save up soda cans for weekly trips to the office recycling bins. You go to the annual company picnic. But these days, if you manage a Macintosh local area network and want to be a truly good corporate citizen, you may have to acknowledge that your company views PCs other than Macs as P.C. (that is, politically correct). No matter how trouble-free your departmental Macintosh LAN, how smoothly it hums along, management's agenda may include connecting it to the corporate network—often a PC network, usually running Novell's NetWare. After all, NetWare is the most widely deployed network operating system.

Turns out that connecting Mac and PC networks is more than a way to homogenize the corporate culture. There are lots of performance-based reasons for your Mac network to talk to a NetWare server. At the network operating system level, NetWare itself is a high-performance server environment. At the wiring level, rapidly descending prices for Macintosh Ethernet cards have made increased speed easier for corporate budgets to accommodate. Also, your Macintosh users may need to run PC applications, or print to devices attached on the PC end. Aside from what connectivity to NetWare can provide your users, *you* may appreciate the wealth of network-management tools it offers. (Of course, to get all these benefits, you must buy a NetWare licensing agreement to cover the additional Macintosh users.)

Given all the reasons for PC-to-Mac connectivity, the question becomes, How can you connect your Mac clients to a NetWare server? Several methods exist for connecting to NetWare 3.11, the version most companies use. Which method you choose depends on which benefits you're after, how many users you're connecting, and how big your budget is.

The first option is Novell's NetWare for Macintosh, sold as a set of NetWare Loadable Modules (NLMs) for NetWare 3.11. (I tested NetWare for Macintosh 3.011; for information about NetWare for Mac 4.0, see *Networks* news in this issue.) The software loads on the NetWare server to provide the operating system with a complete set of AppleTalk protocols. This option is pricey, but may be worth the cost if you want NetWare-like management tools, password protection, and bidirectional printing. A second possibility, Miramar Systems' MacLAN Connect for NetWare, helps you configure PCs as AppleTalk Filing Protocol (AFP)–compliant servers. This gateway option can misbehave, but is considerably less expensive than NetWare for Mac. Third, Dayna Communications' NetMounter (contained in DOS Mounter Plus) mounts the NetWare server as a volume on the Macintosh desktop. It's an easy way to provide access to files stored on the NetWare server but is not intended to help create a homogeneous Mac-PC environment. And finally, the combination of Insignia Solutions' SoftPC Professional and SoftNode emulation software enables the Mac to run PC applications in a window under the Macintosh Operating System, albeit at much slower speeds.

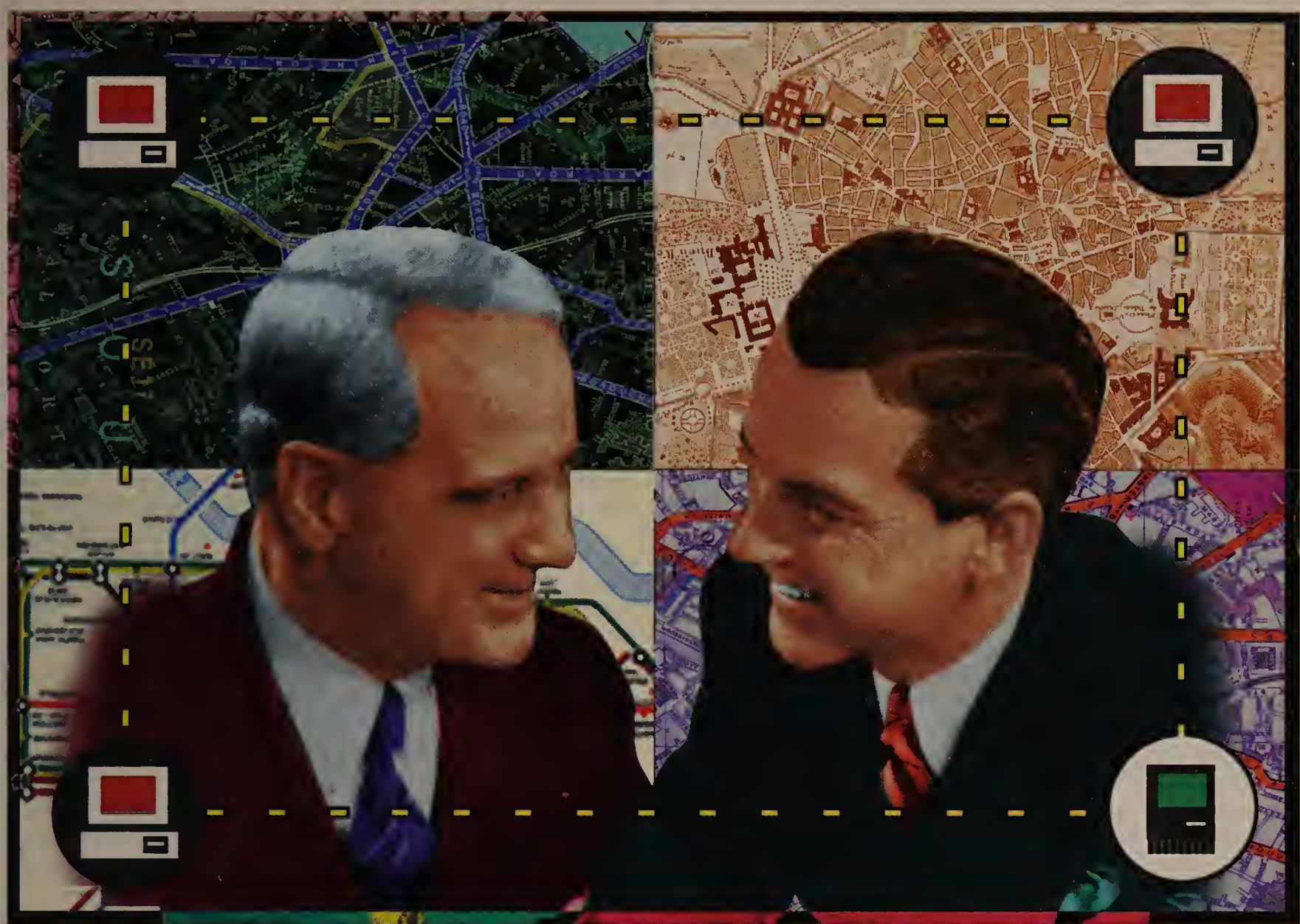
Choosing Sides

In essence, each of these products is designed to overcome one obstacle. NetWare relies on the Internetwork Packet Exchange (IPX) protocols to create and deliver packets and on the NetWare Core Protocols (NCPs) to define workstation requests. But all Macs come ready to network using AppleTalk protocols—AFP for communicating with servers, and the Printer Access Protocol (PAP) for communicating with printers. For client and server to communicate, you must create either NetWare server support for AppleTalk protocols or client workstation support for IPX. (Novell recently started offering MacIPX, a Macintosh client version of IPX, to developers; see *Macworld News*, July 1993, page 85.)

The question of where to place the bulk of responsibility for network communications—at the server or at the client—has a great deal to do with the way you view network administration. For some, the question takes on the importance of a "religious issue," as Apple's AppleTalk evangelist R. Garry Hornbuckle says.

On one hand, it makes sense to adapt the server to meet the client's needs—creating server support for AppleTalk protocols, as do Novell's NetWare for Mac and Miramar's MacLAN Connect for NetWare. The underlying logic is that, in addition to being more secure, servers tend to be centrally administered; you have to load new programs or upgrade existing ones only on the server, not on dozens of clients.

On the other hand, Dayna's NetMounter and Insignia Solutions' SoftPC Professional and SoftNode offer the advantage of having the client Mac, not the server, support IPX without requiring modifications to the server. This setup frees the server from handling the AppleTalk protocol processing overhead and allows the Mac client to connect to servers not running under special software, such as NetWare for Mac.



ANDREW FAULKNER

NETWARE

BY JIM CARR

In addition to choosing whether to let the responsibility lie with client or server, you're going to have to make some decisions about physical connectivity. This article focuses on software connectivity, but be forewarned that you will have to make hardware choices, too. If you have only a few Macs, and network traffic will be light, you may want to consider connecting to the server by simply installing a LocalTalk card in the server. However, your network will be limited to LocalTalk's 230.4-kilobits-per-second (Kbps) speed. If you want the 10-megabits-per-second (Mbps) Ethernet speed, you're going to have to install an Ethernet card in each Mac. That implementation could become expensive unless all your Macs are Quadras, which come with built-in Ethernet. You can also use a router to act as intermediary between the NetWare network's cabling system and LocalTalk.

Never Fear NetWare?

Whichever option you choose for connecting your departmental Macintosh LAN to the corporate NetWare server, administering the NetWare 3.11 operating system can be tough—especially for those without previous NetWare experience. Installing and administering NetWare for Mac itself will require little additional NetWare expertise on your part. Even the most NetWare-phobic should find NetWare for Mac pretty straightforward.

NetWare for Mac comprises several server-based modules, or NLMs, and a number of applications for installation on the client Mac. NLMs are programs that link disk and network software drivers and file-server–management utilities to the core NetWare operating system. You can load and unload NLMs at will without taking down the server—a big advantage if you don't always need full functionality. The documentation is relatively clear, and the installation program is automated. (However, first-time installers should consult the *Macworld Networking Handbook* [IDG Books Worldwide, 1992] for help in understanding AppleTalk protocols in non-Mac contexts.)

The ease of installation extends to the client stations. NetWare for Mac does not require any additional software to be configured at the client. However, you may want to install some of the optional utilities that take advantage of NetWare-specific features, such as print-queue manipulation, access privileges, and broadcast messaging. Once server installation is complete, and you have config-

ured your server to require encrypted passwords, users log in to the NetWare server by pulling down the Chooser, clicking on the AppleShare icon, selecting the appropriate zone, clicking on the appropriate server name, then clicking on OK (see "Getting to the Server"). Although this process takes only a few steps, you can speed it even further by opting for less security and requiring only the Apple Standard User Authentication Method (UAM), rather than NetWare-encrypted passwords. With Apple UAM, users can automatically mount the server volume upon log-in.

Once the user is properly logged in, the server volume appears as a file-cabinet icon on the desktop. Double-clicking on a Mac file icon within a server volume opens the file and the application. DOS-based files, including applications, are also represented within the mounted volumes. However, you cannot open and read DOS files from the Mac desktop unless they contain ASCII text. Macintosh users do have full access to NetWare print queues, however, and PC users can print to printers on the Mac side.

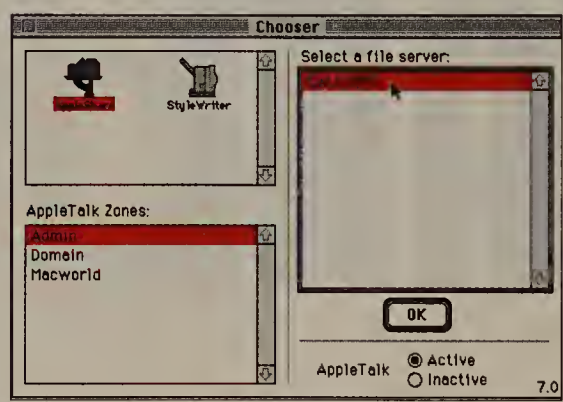
Even if, as a NetWare novice, you overcome your fear of installation and long-term use, Novell's pricing structure may dissuade you. NetWare for Mac's site licensing agreement is a costly $495 per 5-user license, $895 for a 20-user license, $1995 for a 100-user license, and $2995 for a 200-user license. And again, those prices are in addition to the cost of the NetWare 3.11 licensing agreement. Compare those prices with the cost of the other product that places AppleTalk protocols on the server: $695 per 40-user configuration of MacLAN Connect. You'd better be getting something extra with NetWare for Mac, right? In my opinion, you are. Your money buys a level of reliability that MacLAN Connect simply does not provide.

You are also paying for a superior level of network security. NetWare for Mac enables administrators to take advantage of Novell's encrypted password protection, a feature that some of the other Mac-to-NetWare connectivity options do not directly support. NetWare for Mac also ties you into NetWare's powerful access-privileges facility. Instead of such rights as See Files, See Folders, and Make Changes, NetWare lets you have Read, Write, Erase, Modify, Create, File Scan, and Access control, as well as Supervisory rights, to both folders and files.

And once NetWare for Mac is installed, Mac administrators can perform most of their system administration from a Macintosh, not a PC. NetWare for Mac's NetWare Control Center (NCC) provides nearly all the functionality of NetWare's SYSCON management utility. With NCC, administrators can add and configure groups and establish trustee rights, change passwords, and manage print queues, and through these settings determine which server-based files, volumes, and folders each user and group of users can access.

Unfortunately, NCC lacks access to the server-resource accounting options found in SYSCON. These accounting options enable NetWare supervisors to set up a variety of audit-tracking functions, such as charging users or groups for disk or server resource use and limiting user access by time, date, or network address. NCC forces Mac supervisors to use SYSCON if they want to charge various departments for network server usage. That means moving to a networked DOS machine. Another option is to use Insignia's SoftPC Professional with SoftNode to run SYSCON on the Mac. Although I found the SoftPC/SoftNode emulation extremely slow, it is well suited for occasional use of SYSCON. If you have SoftPC and SoftNode or are willing to invest in them for this purpose, you will also need to physically connect the Mac running them to the Ethernet network or use a LocalTalk-to-Ethernet router.

NetWare for Mac also provides the NetWare server with name-space support for non-DOS file names. So when a Mac saves a file to the server with a valid Macintosh file name of up to 32 characters, NetWare for Macintosh writes the entire file name to the server directory. However, this functionality isn't without penalty. According to Novell, each volume supporting a second name space requires twice as much server cache memory as one supporting only DOS file names. (As an aside, consider the name-space support available in your backup software. If your backup software is server-based, make sure that it can back up Mac files properly, particularly file names sharing the same first eight characters. If your backup method uses the DOS naming structure, and you create and erase files frequently, you may have trouble restoring the correct Mac file.)



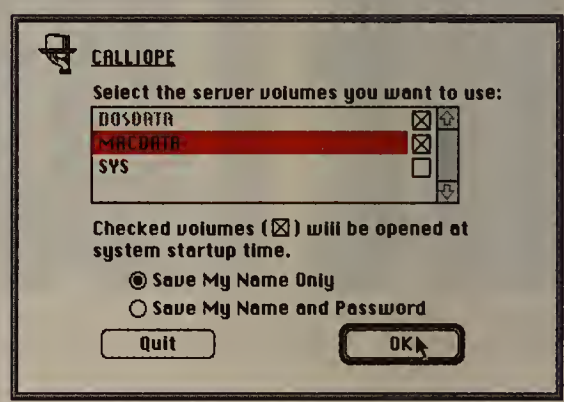
Getting to the Server With Novell's NetWare for Mac, you log in to a NetWare server via the Chooser.

MacLAN: Gateway to NetWare

In contrast to NetWare for Mac, the less-expensive MacLAN Connect is a temperamental application both from an installation and an operational standpoint. The program configures an Intel-based PC as a gateway to a NetWare server (see "Gateway Option"). It requires dedicating a separate high-performance PC as a MacLAN Connect server—the gateway machine must be of the same class CPU as the NetWare server.

MacLAN Connect also requires installing and configuring two network adapter cards in each MacLAN Connect server—one for running Novell's IPX, the second for running AppleTalk. But Miramar's list of supported cards is limited. I tried two other cards, before acquiring the only supported EtherTalk card—a 3Com EtherLink II (known as the 3C503). I still had to use Novell's JUMPER utility to avoid a conflict with the memory address of the Intel card. This step is undocumented by the MacLAN Connect user guides, but without it, I could not bind the IPX drivers to the Intel card.

On the plus side, MacLAN Connect lets you import NetWare user and group accounts and NetWare volumes into the MacLAN Connect database, saving you from duplicating setup tasks performed at the NetWare server. Miramar also supplies MacLAN Connect administrators with a Mac-based administration program that permits reconfiguring the MacLAN Connect server once it is up and running. This application operates much like NetWare for Mac's NCC, giving the Mac-literate, PC-shy supervisor an effective set of administrative tools.



Volumes and Volumes Dayna's NetMounter gives users two options for opening server volumes automatically at start-up—by saving just a user name or by saving both name and password.

At the client, MacLAN Connect, like NetWare, uses standard AppleShare

COMPARING MAC-TO-NETWARE CONNECTIVITY CHOICES

NetWare for Macintosh 3.011

Novell (501/947-0998; 800/638-9273); 5-user license $495; 20-user license $895; 100-user license $1995; 200-user license $2995.

How It Works

Mounts NetWare server as a volume on Macintosh desktop.

Advantages

- Fully supports NetWare's password encryption.
- Enables administrators to run most NetWare management utilities from a Macintosh.
- Allows bidirectional printing.
- As a NetWare Loadable Module (NLM), can be loaded and unloaded as needed.
- Software is centrally administered at server.
- Provides Mac name-space support, but this support taxes cache memory.

Disadvantages

- Expensive.
- Does not provide SYSCON's resource-accounting option.
- Users cannot automatically read DOS files.

MacLAN Connect for NetWare

Miramar Systems (805/966-2432); 40-user license $695.

How It Works

Configures dedicated PC as a gateway to NetWare server.

Advantages

- Allows bidirectional printing.
- Supports multiple levels of password protection.
- Inexpensive (but requires dedicated PC).
- Requires configuring software for gateway only.

Disadvantages

- Requires two network cards in gateway PC.
- Supports only 3Com 3C503 adapter for EtherTalk.
- Requires administrator be DOS literate.
- Documentation does not describe potential address conflicts between cards.
- Users cannot automatically read DOS files.

NetMounter (part of DOS Mounter Plus)

Dayna Communications (801/269-7200); single-user version $99.95; ten-user license $750.

How It Works

Enables Macs to mount the NetWare server as a volume on the desktop.

Advantages

- Enables Macs to access DOS files residing at the NetWare server.
- Does not require modifications at the server.
- Supports name-space mapping, so when a Mac opens DOS files with particular extensions, corresponding applications are automatically launched.
- Inexpensive.

Disadvantages

- Does not support bidirectional printing.
- Macs must be on same physical network as server unless IPX gateway is used.
- Provides standard AppleShare password protection only.
- Doesn't create truly integrated Mac-PC network environment.
- Requires updating software at each workstation, rather than at the server.

SoftPC Professional and SoftNode

Insignia Solutions (415/694-7600; 800/848-7677); SoftPC Professional $325, SoftNode (required for connectivity to NetWare) $149 for one user.

How It Works

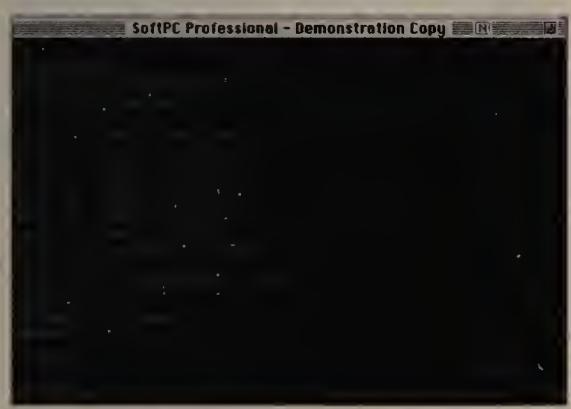
Enables Macintoshes to run PC applications in a separate window.

Advantages

- Enables managers to run NetWare management utilities from a Mac.
- Enables users to run PC applications on their Macs.
- Supports NetWare's encrypted password protection.

Disadvantages

- Requires 8MB of RAM on Mac.
- Requires knowledge of DOS.
- Slow because of real-time emulation of DOS applications.
- Does not integrate Macintoshes and PCs by providing such services as bidirectional printing.
- Requires updating software at each client.



The Mac as a PC Node Logging in to NetWare from SoftPC Professional on a Mac is identical to logging in to NetWare from a PC. This screen shows how SoftPC Professional and SoftNode map the Mac's drives in concert with the NetWare server drives. The Search commands in the illustration tell DOS programs in which directories to look for various executable, or application, files.

workstation software available via the Chooser. MacLAN Connect displays volumes as a Mac or PC icon. Files on the Macintosh volumes are accessible just as any other file on the Mac is, but DOS-based applications cannot be opened directly from the Mac desktop because they lack the type and creator codes required by the Finder. You can open an ASCII file from your word processor, however, which will create the needed type and creator codes. And MacLAN's configuration program permits mapping DOS File extensions.

MacLAN Connect's temperamental behavior resurfaced when I tested its handling of unexpected NetWare server errors. When I took the NetWare server down with the MacLAN Connect server still running, the performance of my Macintosh client slowed to a crawl, and I wasn't allowed to save my work at the client station.

MacLAN Connect does send a message to all attached Macs when its supervisor begins the process of shutting down the MacLAN Connect server, and then displays a message indicating that the server has been shut down. It does not, however, forward broadcast messages from a NetWare server to its client stations. This failure could prove disastrous when a NetWare server supervisor sends a broadcast message warning of an impending server shutdown. If the MacLAN Connect supervisor doesn't subsequently begin to shut down the MacLAN Connect server, thus initiating a warning to clients to save their work and log out, then MacLAN Connect clients will lose their work.

Another problem: If you take the NetWare server down without first shutting down the MacLAN Connect server, you have to rebuild that server's system files. You cannot simply reboot the MacLAN server by rerunning its configuration program. You must go to the MacLAN Connect gateway to rebuild housekeeping files, such as server application data files required by MacLAN Connect.

MacLAN Connect does offer several advantages over NetWare for Mac. The supervisor must set up only one account for the gateway, not one for each Macintosh user. And it's substantially less expensive than NetWare for Mac. Like NetWare for Mac, MacLAN Connect provides bidirectional print services—Macs can print to NetWare-attached printers, and PCs can print to AppleTalk-based printers. It also supports multiple levels of password protection.

NetMounter: IPX on the Mac

Dayna's NetMounter and Insignia Solutions' SoftPC Professional and SoftNode run IPX on the Mac. While this approach may disturb those who prefer centralized administration at the server, these packages will be a boon to many sites.

Dayna developed its own version of IPX for NetMounter on the Mac; Insignia Solutions ships SoftNode with Novell-supplied IPX. Both communicate with NetWare without problems. In my testing, I ran several versions of the NetWare workstation shell programs supplied with SoftNode on a 486-based PC client without modification and experienced no compatibility problems.

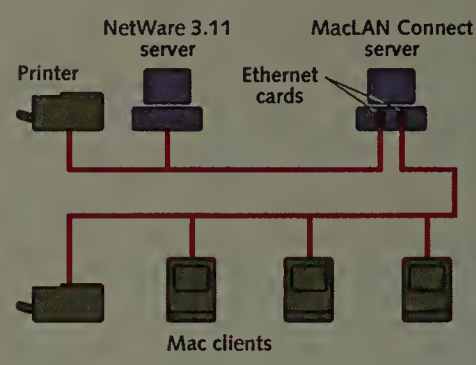
As its name indicates, NetMounter mounts NetWare volumes on the desktop of every Mac on which it is installed. It's an easy, low-cost ($99 per package, $750 for ten users) means of giving your users access to NetWare files, provided that your Macs are on the same physical network as the server or an IPX gateway is used. This product is not intended to help create a homogeneous Mac-PC environment. Mac users cannot access PC printers, nor can PCs access Mac printers. And NetMounter does not give administrators access to NetWare's administration tools.

But users can access files on the NetWare server, and they can create automatic file-extension mappings for them. For example, with mapping, when a DOS file with an .XLS extension is opened, the Mac client automatically launches Microsoft Excel. Like MacLAN Connect and NetWare for Mac, NetMounter supports start-up mounting of NetWare volumes, which speeds the log-in process (see "Volumes and Volumes"). However, your server must not require NetWare encrypted passwords for start-up mounting to work when you use NetMounter's Save Name and Password. Otherwise, the name-and-password option will hang your Mac before start-up is completed.

In addition, you should be aware that when taking the server down, you must have the NetWare Notify extension installed for NetMounter to capture or display the server-console broadcast messages. If Notify is not installed, the all-too-familiar Macintosh message "The server's connection has unexpectedly shut down" will appear—but probably too late for you to save your work to the server. Without Notify, you won't get the more timely NetWare message.

NetMounter offers an effective, inexpensive way for a limited number of users to tap into NetWare-based files. Maintaining and upgrading several dozen or more NetMounter clients could be a problem, however.

Gateway Option



MacLAN Connect, unlike other NetWare connectivity options, runs on a DOS PC that acts as a gateway to a NetWare server, which is also a DOS PC. NetWare recognizes the MacLAN Connect server as a network node rather than recognizing the individual Macintosh clients.

Funny, It Looks Like a Mac

If your Macintosh users need to run PC applications, Insignia's SoftPC Professional and SoftNode could be the way to go. With them, Macs can run DOS applications in a window, as long as the application requires no 386- or 486-specific features. Consequently, nearly all of the network-administration tools available on a PC—including encrypted password protection—are available on Macs running this emulation software.

The Insignia products require a knowledge of DOS. When installing SoftNode, the complement to SoftPC, you have to first start SoftPC, thus opening a window running DOS on the Mac. With the exception of a menu bar across the top of the screen, your Mac emulates a PC, forcing you to use DOS command-line entries.

And once users log in to the NetWare server, just as they would from a PC client, operating under the SoftPC Professional–SoftNode combo is identical to running on a PC, except slower—much slower (see "The Mac as a PC Node"). Performance is my principal complaint with SoftPC. Running a **Dir** search on the server's SYS: volume, for instance, took 13 seconds on an old IBM XT running at 4.77MHz, and 115 seconds on the 16 MHz LC II. This slowness is because of the real-time conversion processing SoftPC must undergo to run PC programs on the Mac's Motorola processor.

As a result, Insignia Solutions positions the SoftPC Professional–SoftNode combination for only occasional use—for example, by a Macintosh network supervisor running SYSCON. While the SoftPC-SoftNode combo does provide relatively easy connection to NetWare, I agree that its use is of limited value to most users accustomed to the Mac's graphical interface. A SoftPC with Windows version is available (see *Reviews*, *Macworld*, June 1993).

For a Mac-only network administrator who can't justify the costs of buying a new PC with a hard drive and a network adapter card, Insignia's approach might work. However, if you buy the SoftPC-SoftNode combination for occasional use, such as for running SYSCON, consider the total cost: SoftPC Professional is $325, SoftNode is $149, and you may need additional RAM (8MB is required; I spent $180 for an additional 4MB). If your company has an older PC ready for retirement—an XT will do fine—I'd suggest using it to run SYSCON.

What to Do

Chances are you'll soon have to connect to the corporate NetWare network. When considering connectivity options, ask yourself these questions. Will users need bidirectional printing? NetWare for Mac and MacLAN Connect provide this feature. Will users need to run PC programs? If so, Insignia's products may be the solution.

Do users require only basic access to files on the NetWare server? Consider Dayna's NetMounter.

But if what you need is to fully integrate many Mac clients into a NetWare server every single day, NetWare for Macintosh is the right choice. Although priced higher than the other options, this product provides centralized administration, password encryption, and a level of Macintosh-to-NetWare integration that other products lack. **m**

JIM CARR, a writer based in Saratoga, California, has covered the networking industry for a decade.

MAC-TO-NETWARE CONNECTIVITY SOFTWARE

Macworld looked at four approaches to connecting Macintosh clients to a NetWare 3.11 server. All four are workable, but for daily use by many clients, one product stood out.

NetWare for Macintosh If you want to truly integrate your Macintoshes into a NetWare network for daily use, use NetWare for Macintosh. Its robust performance, management, and security make it worth the price. **Company:** Novell. **List price:** $495 for 5-user license to $2995 for 200-user license.

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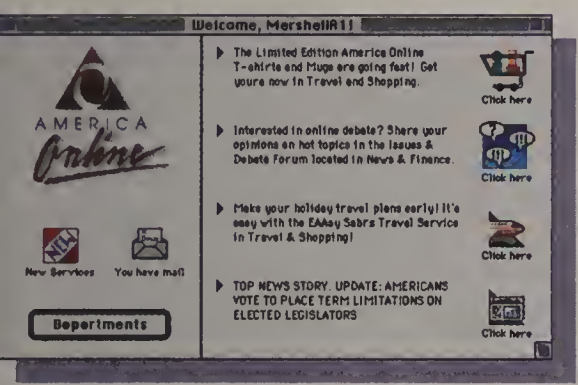

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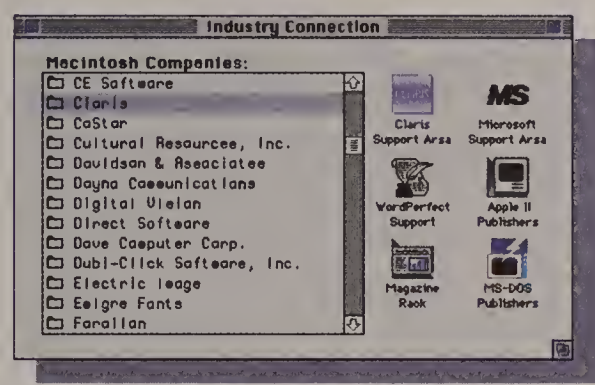

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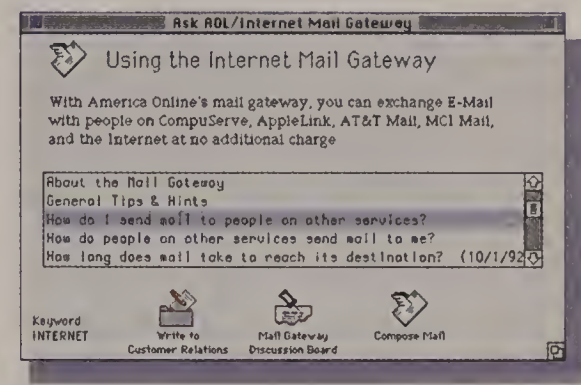

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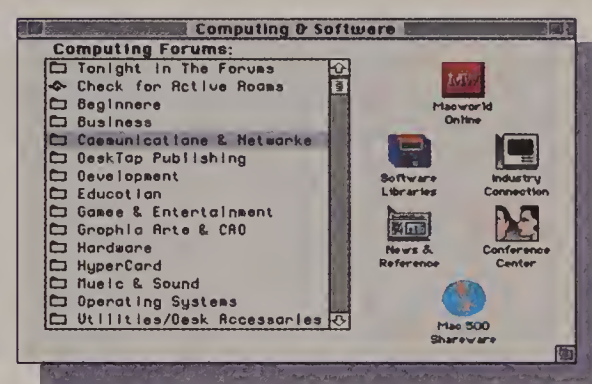

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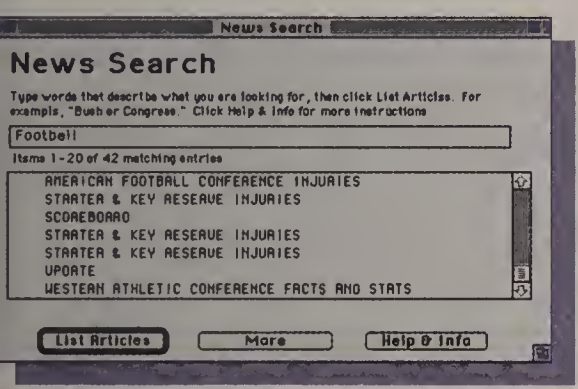

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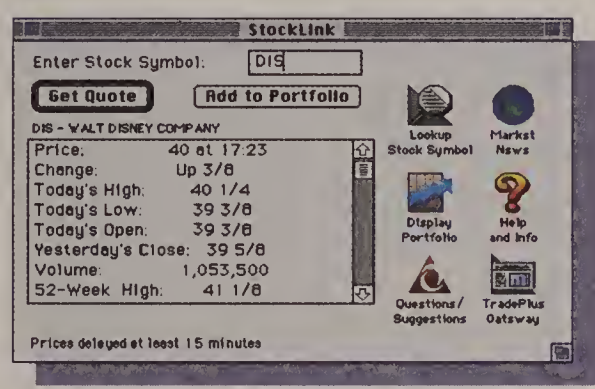

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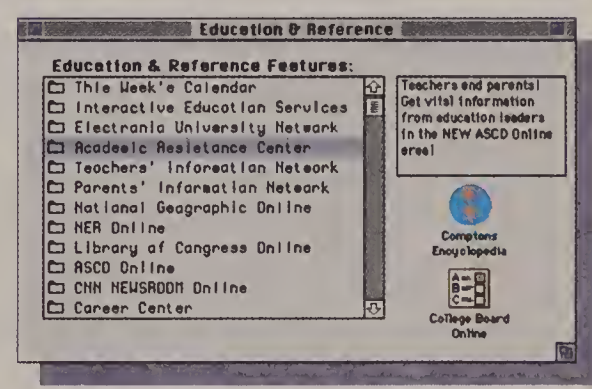

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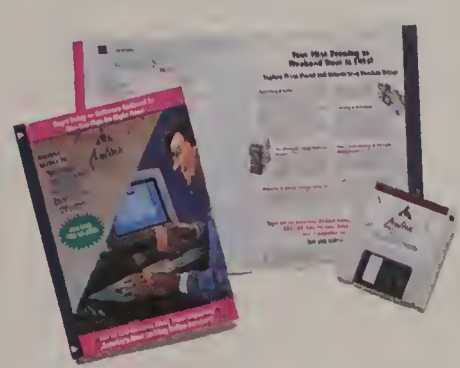

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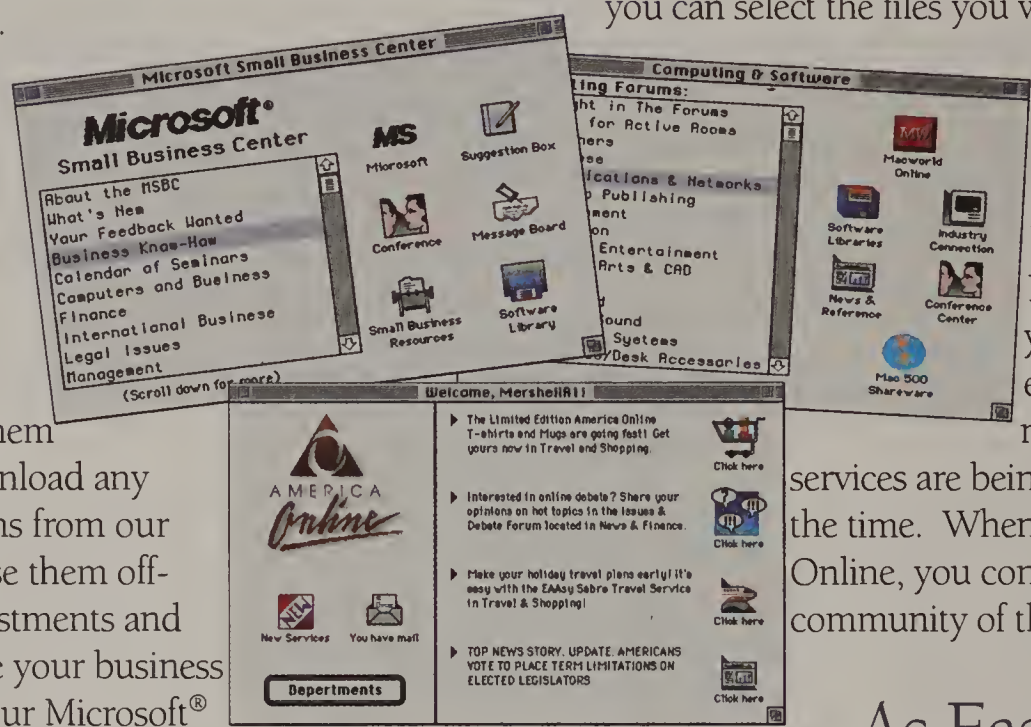

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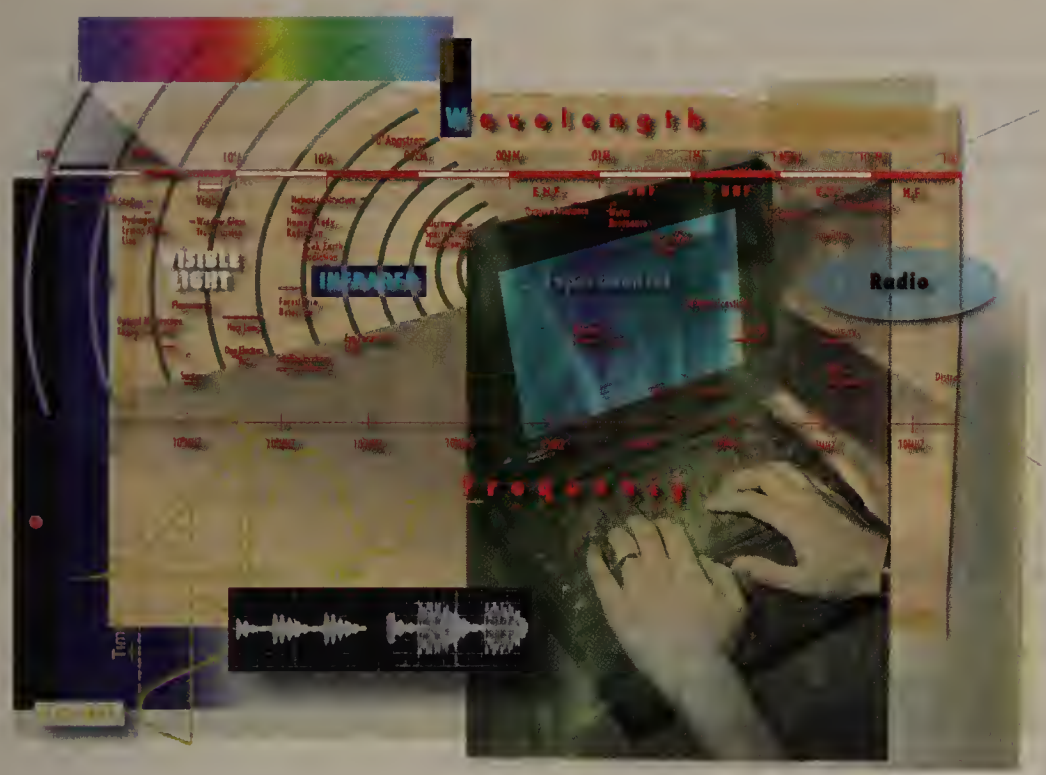

UNLEASH YOUR LAN

Which wireless technology is right for your network?

BY MELANIE McMULLEN

Portable phones, beepers, baby monitors, and remote controls—the world is wired about wireless gadgets in all their forms and functions. And communications technology will most certainly be the next in line to be unleashed. Although wireless network technology is nascent, in the next few years it will become more than a space oddity. By the year 2000, wireless LANs will account for 10 percent of all nodes, according to International Resource Development, a market research firm in New Canaan, Connecticut.

But with wiring being cheap and ubiquitous, what will motivate this change? One factor: mobile mania. According to recent studies, more than 25 million Americans currently work outside their offices. A PowerBook and a PDA could become as crucial to these people's jobs as an M.B.A. Commuter computers are the pens and pencils, the bare necessities, of the moving desktop. These tools will usher in a new way of working—and networking.

Wireless communications could allow users to network easily and spontaneously in conference rooms, on a plane, in a train, in a classroom, or on a retail-store floor. Wireless Macintosh users also have an inherent communications advantage—AppleTalk. Unlike other protocols, AppleTalk doesn't force users to set up node addresses or announce themselves to the network. Because AppleTalk dynamically assigns node addresses, the protocol is well suited to building and destroying temporary LANs.

On a large scale, radio links can cover a campus environment and, eventually, facilitate worldwide connection of wide area networks composed of pen-based devices, laptops, and pagers. On a small scale, although wireless technology costs more than twisted-pair or coax cable schemes, wireless networks can be up and running in half the time that it takes to configure a wired network.

Most important, the popularity of portable hardware and accompanying software mandates freedom in networking. Portable computing's success depends on wireless connectivity, PowerBooks, and the upcoming onslaught of personal digital assistants, such as the Newton, which has just started shipping. The last thing a mobile worker wants to do with a portable device is hitch it up and tie it down in order to print or transfer data or E-mail.

Back to Basics

This wireless evolution can breed confusion. Wired networks are here-and-now, while wireless ones, no matter how interesting to see on the demo shelf, are still in the neato-but-it's-plasticware phase.

So the first question is whether you really need wireless networking. Most buildings are already wired for communications; unless you plan on several moves and relocations, justifying the more expensive wireless technology can be a hurdle. For example, the average cost per node for an Ethernet connection is $150 to $300, while the average cost per node for a wireless connection ranges from $500 to $1000, depending on the wireless technology.

In addition, network transmission speed between wireless devices is almost always slower than the same network using a wired configuration. For instance, 2 megabits per second (Mbps) is speedy for a wireless product. While that's faster than 230-kilobits-per-second (Kbps) LocalTalk, it's not fast compared with 10-Mbps Ethernet, 4/16-Mbps Token Ring, and 100-Mbps FDDI.

But if price and speed matter less than mobility, and you need the flexibility and freedom that wireless networking can give, then master the basics of wireless transmission and choose the technology that best suits your financial and functional needs.

As a general rule of wireless transmission, the higher the data rate, the shorter the range. For example, an infrared device that relies on line-of-sight transmission may have a decent data rate of 2 Mbps or more but extend only a short distance, around 20 to 80 feet. Each wireless vendor has to maintain a delicate balance of speed and range when developing products, and you have to decide which is more vital to your network.

The most common modes of wireless transmission—spread-spectrum radio, cellular radio, and microwave—use different frequencies of the electromagnetic spectrum. Frequency determines range, speed, ability to penetrate walls, licensing requirements, and ultimately, cost.

The two most-popular transmission modes for local area networks are spread-spectrum radio and infrared, which each have pluses and minuses, depending on the environment. Expect to see Apple and other companies releasing products for the Mac in both areas later this year. Spread-spectrum, because of its ability to penetrate walls and its good transmission range (up to 500 feet, in some cases), promises to be a more flexible solution for wireless networks and has already become a de facto standard in the wireless market for DOS and Windows PCs. But, in terms of network development, infrared is the most established technology.

Seeing Red

Infrared networks use infrared light to transmit a signal to a receiving target. An example of this type of transmission is a TV remote control. Infrared transmissions are not government regulated and thus do not bump into the political and regulatory hurdles created by the Federal Communications Commission (FCC), which governs and divvies up spread-spectrum-transmission bandwidths.

But infrared transmission does bump into a bigger wall—literally. Infrared light, falling between microwave and visible light in the electromagnetic spectrum, shares some properties of visible light: it reflects off, but can't penetrate, solid objects, such as walls. Therefore infrared networks are best suited for factory floors, open meetings, or close-range, device-to-device transfers, such as a print request from a PowerBook to a desktop printer.

On the upside, since walls will keep the signal in, infrared networks are highly site-secure; the network data never leaves the room. Additionally, infrared is immune to electromagnetic and radio frequency interference, making it unlikely that someone could interrupt or intercept the data. Infrared transmission is so secure that the brokerage firm Lehman Brothers in New York uses a wireless infrared network on the trading floor. Also, infrared devices tend to be smaller than radio-based devices and don't cost as much to develop, so their prices will be lower.

Photonics Corporation (408/955-7930), which is partially funded by Apple, started developing Photolink, one of the first wireless infrared products for the Macintosh, in 1985 (it shipped in 1989). Based on a directed-transmission method, Photolink used a LocalTalk setup in which four Macs beamed their signals to a target on a wall or ceiling. Last year Photonics discontinued Photolink and developed a diffuse-transmission method aimed at a more mobile approach to wireless networking than the stationary Photolink network.

Photonics' new technology still uses infrared; the diffused signals bounce off desks, walls, and even people, eliminating the need for point-and-shoot devices. While this signal floods the area, it is slightly weaker (that is, has a shorter range) than a directed, line-of-sight transmission. But the signal won't be interrupted by casual passersby, which is crucial in an office environment. Photonics will use this diffuse technology in its Cooperative series of products (price not available at press time). Apple is also licensed to use Photonics' technology, so Apple could incorporate the technology into its own products.

Photonics' Cooperative Mac, scheduled to ship in September, is a user-installed adapter for a Macintosh desktop computer or PowerBook that lets a user create an instant wireless network, an idea—and name—that Photonics has trademarked as a Personal Area Network (PAN). It also allows desktop Macs to function as bridges and routers, linking portable nodes to a wired network. Cooperative Mac works with any device with a LocalTalk connection, including printers, modems, or scanners.

2 MEGABITS PER SECOND IS **SPEEDY** FOR WIRELESS

Since no aiming is needed, diffuse transmission is ideal for portable devices that need instant networking, such as a PowerBook or the Newton. Apple says forthcoming versions of the Newton will have infrared connectivity (see "A Small Revelation," in this issue). Putting infrared connections and boards on these devices makes sense, and you should expect to see these options become standard as the technology progresses.

Tune In to Radio

While infrared networks are locked inside a room, spread-spectrum radio-based networks can penetrate walls and thereby offer traits and benefits more similar to those of a wired network.

But radio transmission has its own set of troubles. Spread-spectrum transmission distributes, or spreads, a radio signal over a broad frequency range. Most of these networks currently transmit in the 902MHz-to-928MHz Industrial, Scientific, and Medical (ISM) frequency range, which the FCC set aside in 1985 for wireless data communications.

But data networks, slow to arrive compared with other wireless wonders of communications, have to jockey for slivers of space in this range. In fact, the band is frequently referred to as the garbage band because of other spectrum-hogging equipment that already uses it, such as antitheft devices, commercial radio, television, and cellular phones.

Users of the ISM bands transmit via several techniques; the two most common are direct sequence and frequency hopping. In direct sequence, signals are spread over a continuous band of frequencies. Each bit of information is replicated many times and transmitted as smaller pieces, or *chips*. The chips are received and, using a unique spreading code, reassembled into the original bit. Using multiple chips to convey a single bit provides reliability, while using a unique spreading code provides security.

Frequency hopping does what its name implies—it switches signals from one frequency to another to avoid interference. Multiple chips are transmitted on a specific sequence of frequencies, where each frequency is used only for a short duration. The frequency-hopping method of spread-spectrum transmission provides security through its unique hopping pattern. Since many users share ISM bands, interference is a big concern, and frequency hopping is a popular solution. Apple is developing frequency-hopping transmission methods, which the PowerBook developers at Apple are looking at as a possible wireless solution for the PowerBook and the PowerBook Duo.

Getting Personal

Since data communications using spread-spectrum transmission are essentially running out of air in the ISM bandwidth, Apple decided in 1991 to ask for more. The company petitioned the FCC to allocate a band of frequencies 40MHz wide to an area Apple dubbed Data Personal Communications Services (Data PCS), targeting this slot for its personal digital assistants.

In July 1992, the FCC gave Apple half of what it requested and entered a proposal to designate a band in the 1910MHz-to-1930MHz range for what the FCC dubs User-PCS products. Since bandwidth distribution from the FCC is a long and arduous process, redistribution could take several years. Most likely, bandwidth will be doled out in pieces, with Apple and others lobbying for specific areas in which they can optimize their technology.

Since quick-to-die batteries are a problem with portable computing devices, efficient, low-power usage is critical to the success of mobile wireless networks. Much as you have to talk louder in a crowded room to be heard, successfully communicating in a noisy channel requires more powerful—but also power-consuming—signals. One way around this is to use more bandwidth, talking softly in more elaborate codes versus just talking louder. Using more bandwidth takes less power.

The User-PCS band would be open to all manufacturers—not just Apple—that are interested in creating products using existing data links and network protocols. While some wireless networks use their own proprietary protocols for transmission, wireless networks are best served by devices that use existing wired protocols, such as Ethernet, since the majority of wireless networks will connect at some point to the wired world. Wireless networks usually access a wired network via a hub that recognizes both types of connections. Wired or wireless, the protocol doesn't know or care—it simply facilitates transmission of the data.

Making Waves

One of the first spread-spectrum based products developed specifically for AppleTalk environments is Digital Ocean's (913/338-1595) Grouper (under $500 per unit), which is scheduled to ship in September. Designed for connecting PowerBooks and other LocalTalk devices, the Grouper provides wireless network access, based on direct-sequence transmission, within a 250-foot radius in an average, indoor environment with separate offices or within a 500-foot radius in an indoor open office that has few obstructions or walls between nodes. The wedge-shaped Grouper can be attached to a PowerBook or can be used free-standing with a desktop Macintosh.

The Grouper creates a network by

DO YOU NEED WIRELESS TECHNOLOGY?

Use a wireless network when

- You need true mobility. You can move wireless networks without leaving behind costly wiring schemes.
- You hop from meeting to meeting all day. Wireless devices give you the ability to spontaneously network in various locations.
- You have strict building permits that regulate cabling.
- You have walls with asbestos trapped inside or lead paint, a building with no wiring ducts, or a historical building.
- You're going to move or remodel soon, or the network is only temporary, such as at a trade show.
- You need to install a network fast and don't have time to configure and maintain a wiring scheme.
- Your company has lots of salespeople with portables. Wireless connections are good for traveling workers, and you can accommodate visitors on the network.

Use a wired network when

- You're on a tight budget. Up-front costs for wired network devices are lower.
- You want the fastest speeds available. Wired networks can reach 100 Mbps with FDDI.
- You move into a building that is already wired. Don't waste the preinstallation cost that is probably figured into your rent.
- Your network extends over multiple floors, and you have great distances between nodes.
- You want a standards-based network. IEEE 802.3 (Ethernet) products are widely available, while the wireless standards committee, the IEEE 802.11, is still in its infancy and years away from reaching a standard.
- Your workers predominantly use their desktop machines during the day and don't own portables.

joining up to 15 grouper-equipped Macs into a "school." Groupers can also connect directly to wired LocalTalk networks, with one centrally located Grouper in each school directly attached to the network and acting as a hub. A nomadic PowerBook user could then roam from network to network within the building attaching to these Grouper hubs.

The Grouper can be powered by a rechargeable nickel-cadmium battery, five disposable AA alkaline batteries, or AC power at the desktop. The first version of the Grouper will communicate at 382 Kbps on each of its four channels within the ISM band. Digital Ocean plans to move future releases to the 2.4GHz band to increase throughput.

The software can select the channels automatically or a user can manually select the channels, allowing multiple schools of Groupers to communicate in the same areas without interference. For adding features such as an Ethernet connection or data encryption, the Grouper also has a handy PCMCIA (Personal Computer Memory Card International Association) slot. PCMCIA, a credit card–size slot, allows users to add a variety of enhancements—including memory, modems, or network connections—to portable or desktop devices equipped with the slot.

Another spread-spectrum wireless network that came to market this year is Windata's (508/393-3330) FreePort. FreePort users are linked to the wireless network via an IEEE 802.3-compliant (Ethernet) wireless transceiver. By sharing protocols compliant with wired Ethernet, the wireless workgroup can more easily connect with wired workgroups on the same network, without going through a gateway.

The FreePort wireless Ethernet hub, which allows connection of 62 wireless transceivers, costs $7450; transceivers cost $1775 each, including the interface unit. With a throughput of 5.7 Mbps, FreePort can connect up to 256 users, spanning a distance of 260 feet. Each transceiver accommodates up to eight users. Spread-spectrum signals, operating in the 2.4GHz-to-2.485GHz and 5.725GHz-to-5.850GHz ranges, are transmitted to and from the wireless transceiver via the FreePort wireless hub. The hub provides connectivity to wired Ethernet networks, synchronization of all FreePort transceivers, access security, and transmission control for power levels.

USE INFRARED TO SET UP A NETWORK QUICKLY

Other Links

Another wireless option is microwave transmission. Although this mode of transmission can penetrate walls and reach distances up to 100 yards, it has a few drawbacks. It requires FCC licensing fees, usually reflected in the purchase price. Also, because the transceivers required for this frequency range are much larger than those needed for spread-spectrum or infrared transmission, these devices are not suitable for laptops or portable devices. Additionally, the power required for transmission is more than a battery can provide, rendering microwave transmission fairly immobile.

Motorola's Altair Plus II, using 18GHz radio, can transmit at 5.7 Mbps. To build the system, users mount control modules, on walls or cubicles, that communicate with send/receive user modules connected to network devices, such as printers or computers. Able to handle up to 50 Ethernet addresses, the control module costs $4995. The user module, which connects up to eight devices, costs $1195 for 10BaseT or $1295 for thin- or thick-coax cable.

Motorola (708/576-1600) is also involved in devices on the opposite end of the wireless mobile spectrum, the personal communicator market. Motorola has teamed with General Magic, Apple, and Sony to develop a new breed of one- and two-way communications devices. These products let mobile users keep in touch with the office via cellular paging and messaging using existing mobile networks, run by companies such as RAM Mobile Data, ARDIS, and Motorola.

While the first two-way communications involved simple messaging and E-mail, these devices, with advancements in digital cellular transmission, could eventually link personal communications with portable computing, satisfying the voice and data needs of an enterprise network. This would give users a benefit unique to wireless transmission—remote-control jobs. **m**

MELANIE McMULLEN is a writer based in Alameda, California, who specializes in mobile computing and networking.

CHOOSING A WIRELESS TECHNOLOGY THAT'S RIGHT FOR YOU

Use infrared transmission when

- Your building has lots of potential radio interference. Infrared is immune to radio frequency interference.
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- You have an open office environment or factory floor. Infrared gives you good speed and reliability without walls. If your environment has no obstructions, use line-of-sight infrared for the best distance. If there are obstacles in the room, use a diffused transmission that can flood the signal around an area, allowing a single transmitter to reach multiple receivers.
- You need quick-and-dirty point-to-point transmission, such as from a PDA or PowerBook to a printer. Infrared technology covers about 20 feet and costs less than radio-based devices.

Use spread-spectrum transmission when

- You need a quick mobile network that offers the benefits of wired networks. Spread-spectrum transmission offers microwave speeds without forcing you to get an FCC license.
- You need to penetrate walls. Spread-spectrum transmission can travel several hundred feet.
- You need to have several networks in the same space. Multiple networks using the same vendor's devices can share a single frequency, as long as different data sequences are used. The signal from one network is interpreted by another as random noise and ignored.

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Bodoni
Chicago
Futura Fling
Optima
Terry's Times

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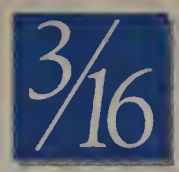
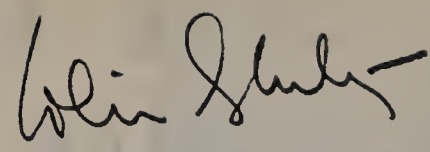


A technical document might need a range of fractions or special symbols; create them quickly and easily in a custom font. Time taken to create: 1 minute Keystrokes required: 6



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NETWORKS

BY CARY LU

PowerBook Notes

PowerBook Memory Strategies

RANDOM ACCESS MEMORY IS A CRITICAL part of any computer, but especially so for a PowerBook. For any computer, more memory supports larger programs, and more programs running simultaneously. PowerBook users have two more incentives to add memory: it boosts the computer's speed and extends battery life.

The key is getting enough memory to set up a RAM disk complete with system files, your main application (or two), and some documents (if you use many programs and files regularly, a RAM disk won't be able to accommodate them all). With a self-sufficient RAM disk, the hard disk drive will not consume power, and—just as important—you won't have to wait for the hard drive to wake up. (For a discussion of RAM disk strategies, see *PowerBook Notes* and *Getting Started*, February 1993.)

To set up a RAM disk, you should have at least 8MB of RAM. If 8MB is good, wouldn't more be even better? Certainly. If your PowerBook will accept 14MB or more, you can create a large RAM disk with multiple applications.

If you don't use a RAM disk, you may be able to get by with the standard 4MB, which is enough for common word processing and spreadsheet functions. If you need to run several programs simultaneously or display color graphics, then you should consider 8MB to be the working minimum.

Efficient RAM Use

TO GET THE MOST OUT OF YOUR RAM, you should adjust your PowerBook's configuration as follows:

• Turn off file sharing, remove unnecessary control panels and extensions to another folder, install a minimum System for your PowerBook model, and then restore only those control panels and extensions that add the functions you need.

• Check the disk-cache setting in the Memory control panel. The lowest setting—which frees the most memory for applications—is 32K. But the ideal cache size depends not only on the specific application but how you use it. If you use many functions within a program, setting the cache to a higher value can improve performance and reduce the need to access the hard disk. If you use only a few functions, a larger cache size offers no benefit. You will have to experiment to find the setting that works best for you.

• Some applications (such as Adobe Type Manager and QuicKeys) set aside a separate RAM cache. In such cases, try reducing the cache size to free up more RAM.

• Check the memory size settings for each of your applications (in the Finder, select the application's icon and type ⌘-I or choose Get Info from the File menu). Reducing a program's memory size may conserve enough space to run an additional application in RAM. In System 7.1 you can change an application's Minimum and Preferred memory sizes; in System 7 you can change only the latter (shown as the Current size). If you set too small a size, however, you may slow that program's performance or cripple it.

• Virtual memory may be helpful under certain circumstances; see "Managing Memory" for more details.

The RAM Upgrade Dilemma

IF YOU HAVE A POWERBOOK 145B, 160, 165c, 180, or 180c, you have 4MB soldered in, so you don't have to remove any memory to add more.

But if you have a PowerBook 145 or 170 (and probably if you have a 100 or 140) you have a 2MB card in addition to 2MB soldered in. To add more memory, you have to remove the 2MB card.

Because you can't add memory incrementally to a PowerBook, you should plan as far ahead as you can for your future memory needs. Once you've added a memory card to a PowerBook, you will have to remove it—just as with the original 2MB card—if you decide to install additional memory later on. The 4MB and larger cards have a better relative resale value than the 2MB cards.

Most memory cards for the Duos come in fixed capacities, but Newer Technology (316/685-4904, 800/678-3726) offers an expandable one—the base unit holds 4MB and you can add one additional card of 4MB, 8MB, or 16MB. Expandable cards are possible despite a Duo's small size because the available space is shaped differently.

Power Consumption

MEMORY CHIPS HAVE TWO STATES: ACtive, when they draw significant power—about half a watt per chip—and standby,

continues

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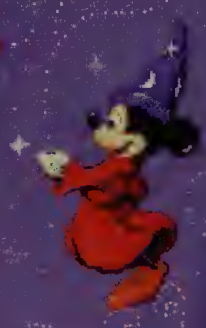
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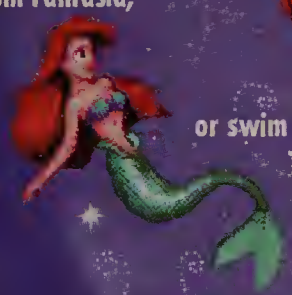
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MANAGING MEMORY

Apple's system software provides the memory features that most PowerBook owners need. However, two of those features—RAM disks and virtual memory—can create some difficulty in practice.

A RAM disk works most smoothly on the PowerBook 100, since its persistent memory preserves RAM contents even during shutdown.

For all other PowerBooks, including the Duos, RAM disks don't survive a shutdown. Although you can often use sleep instead of shutdown, there are times when you can't avoid a shutdown—particularly when you need to change a battery. You must save the contents of the RAM disk before shutting down, and then re-create the RAM disk the next time you start up. This gets tedious quickly.

The workaround solution is RAM-disk software that saves and restores a RAM disk automatically when you shut down and restart the computer. Two products do this: a simple extension in Apple's new PowerBook File Assistant, and the more flexible Maxima, RAM-disk software from Connectix (415/571-5100, 800/950-5880), which provides a full range of installation and start-up options.

If your battery runs down, don't wait until the third and final low-power warning to back up your RAM disk because the battery probably won't have sufficient power to operate the hard disk drive. In such a case your only option is to connect to an external power source immediately.

With System 7's virtual memory, part of the hard disk is treated as if it were RAM, so you can perform memory-intensive activities without much physical RAM. In practice, however, virtual memory is much slower than physical RAM, since accessing data from a hard disk takes much longer than accessing it in RAM. Virtual memory also tends to use the hard disk intensively, boosting power-consumption. Apple recommends not using virtual memory when running on batteries. And Apple's virtual memory requires a full-size-memory swap file on the hard disk. If you have 8MB of physical memory and want to set up 14MB of total memory, you have to create a 14MB virtual memory file on the hard disk. Virtual 3.0 from Connectix has three advantages over Apple's virtual memory: it automatically turns itself off during battery operation; it requires only the spillover space on the hard disk—you need only 6MB on the hard disk to boost an 8MB system up to 14MB; and it's faster.

when they draw very little power. Adding more memory has only a minor effect on the overall power consumption.

Only one major memory-card vendor, Newer Technology, could provide us with power-consumption measurements, and those were only for Duos (for the 100 series, the numbers should be similar). When Newer used a specialized memory-testing program with the backlight turned off, installing a 4MB, 8MB, and 12MB card increased power consumption by 7, 13, and 18 percent—a battery-life reduction of approximately 8, 15, and 22 minutes, respectively. In normal operation, the battery-life penalty should be approximately half those times.

Although adding RAM reduces the length of time a PowerBook can be left in sleep mode, it's not a serious problem; an increase of 4MB to 12MB boosts standby power consumption 5 to 9 percent.

Memory Chip Types

FOR THE 100-SERIES POWERBOOKS, Apple's circuitry assumes the computer has pseudostatic RAM chips instead of the dynamic RAM chips used in desktop Macs. (The Duos use another type of memory, called self-refreshing DRAM.) Whereas dynamic RAM requires constant refreshing signals from the computer, pseudostatic RAM circuitry generates the refresh signal within the chip.

Because of the great popularity of PowerBooks and other laptop computers, pseudostatic RAM is often in short supply. Consequently, vendors often resort to using low-power dynamic RAM (LPDRAM) chips and putting the refresh circuitry on the memory card, external to the RAM chips. Such memory cards may consume slightly more power than cards containing pseudostatic chips.

The RAM chips being produced today are pretty much equivalent. In 1991, when PowerBooks were first available, some chip vendors had just begun to produce LPDRAM chips. At that time, some of these LPDRAM chips consumed up to 50 percent more power than other LPDRAM chips; but their real impact on battery life was small—perhaps ten minutes on a battery charge.

The easiest way to distinguish between a pseudostatic card and an LPDRAM card is by looking at the chips.

continues

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Circle 72 on reader service card

Memory Specs*

	PowerBook 100	PowerBook 140, 145, 145B, 170	PowerBook 160, 180	PowerBook 165c, 180c	Duo 210, 230
RAM soldered in	2MB	2MB (140, 145, 170), 4MB (145B)	4MB	4MB	4MB
RAM on supplied card**	2MB	2MB (140, 145, 170)	none	none	none
Memory speed	100ns	100ns	100ns (160), B5ns (1B0)	85ns	B0ns (210), 70ns (230)
Nominal maximum RAM	BMB	8MB	14MB	14MB	24MB

*Models grouped by form factor. ** The 100 and 140 were also sold with 2MB soldered in and no card.

A pseudostatic card contains only memory chips, which are all identical; an LPDRAM card contains, in addition to the memory chips, one or more smaller chips with different part numbers.

Form Factors

THE VERY LIMITED SPACE AVAILABLE for memory cards causes many of the RAM problems in a PowerBook. What's worse, the form factor—the shape of that space—differs among the PowerBooks. So far, Apple has four form factors for the 100-series PowerBooks, plus a fifth form factor for the Duos (see "Memory Specs"). Memory cards built for one form factor may not fit in another, so make sure the memory will fit inside your PowerBook.

Apple's 2MB card will fit in all PowerBooks except the Duos. Most 4MB cards and all but one 6MB card fit only in a single form factor. The single 6MB exception is the small (and expensive) BookRAM card (Computer Care, 612/371-0061). The BookRAM will fit in all 100-series PowerBooks, although its 100ns speed isn't ideal for the PowerBook 165c or 180.

Memory Speed

IF YOU HAVE A POWERBOOK THAT TAKES 100ns memory and you plan to trade up to a faster model, consider buying 85ns memory now so that when you do get a new PowerBook, you won't hinder its performance with slower memory chips. This will work—with three reservations. First, you'll have to find a card that fits the form factor for both models. Second, using faster memory will not speed up a slower computer. And third, 85ns memory sells for 30 to 45 percent more than the 100ns variety.

Memory for the Duos cannot be interchanged with any memory for the 100-series PowerBooks. The Duo 230 requires 70ns RAM, but 80ns memory is sufficient for the slower Duo 210. Only a few vendors offer 80ns cards; one source is Kingston Technology (714/435-2600, 800/835-6575).

Pushing the Limits

"MEMORY SPECS" SHOWS HOW MUCH memory can be installed in each PowerBook model. But all PowerBooks except the 100 could conceivably take more memory through one of two special techniques, neither of which is available for the PowerBook today.

First, memory could be bank-switched so the CPU looks first at one bank of 6MB to 8MB, then at another bank, and then another as required. This could work quite well, with just a slight reduction in computing speed—but it requires a system software extension.

The second method adds address lines—an extra wire or two soldered between the CPU board and the memory card—so the CPU can access more memory. Direct access is a more elegant solution than bank-switiching, but it requires hardware modification.

High-capacity memory cards are hard to produce with the memory chips available today, but denser chips should arrive soon. With a high-capacity card, you might be able to pack 14MB into a PowerBook 170. But trading up to a 180 would probably be simpler, since the 180 can already handle 14MB. Thus memory extension tricks might become available only for the 160, 165c, and the 180, initially supporting 24MB total RAM and eventually as much as 44MB.

For the Duos, Newer Technology already plans a memory card with 16MB of base memory and a 16MB add-on card, for a total of 36MB. That's well over the nominal 24MB limit that Apple lists in its Duo product specs. But only 32MB are available unless a jumper wire is installed. With a jumper wire, a Duo's circuitry can support up to 40MB.

You know what they say—you can never be too rich, too thin, or have too much RAM. **m**

CARY LU is a *Macworld* contributing editor who covers PowerBook-related issues in this monthly column. When he first wrote about the need for multimegabyte memory in 1982, several readers took exception, arguing that 256K was all a single user would ever need.

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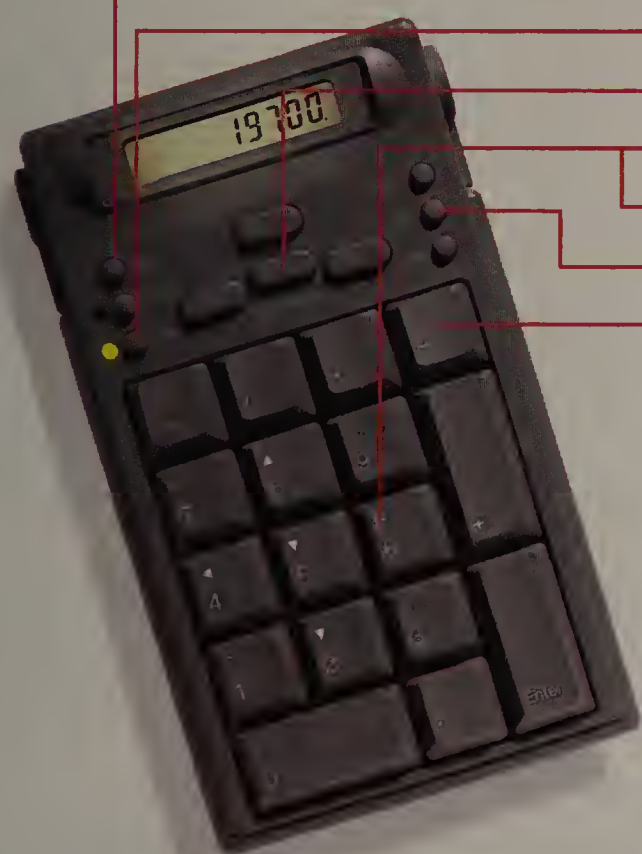

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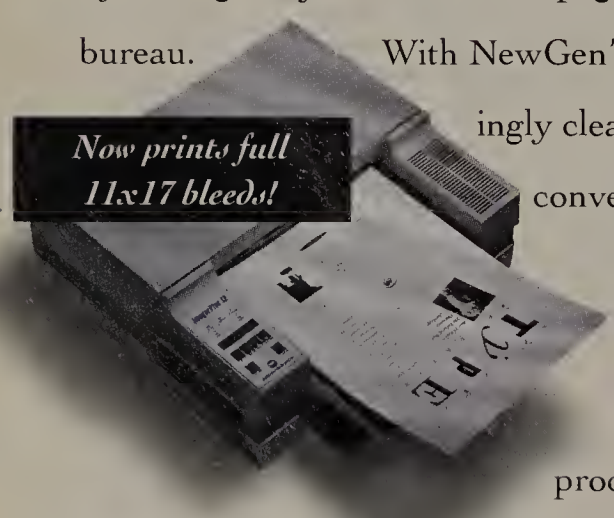

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BY DAVID POGUE

Getting Rid of the Gray

Color desktop-pattern editors mean no gray areas

EVERY SO OFTEN, I FIND MYself inadvertently engaged in one of those silly Mac–versus–IBM PC debates. After the usual volleys of "IBM's cheaper"/"Mac's better," I play my trump card. "Ah," I say with a look of smug confidence, "but the Mac lets you fill the screen background with any pattern you want!" That usually shuts them up. (I'm not entirely sure if I've made a good point or a lame one.)

Anyway, there's no reason to stare at the same gray desktop all day long. If you're one of the 23 people who've figured out how to edit the 8-by-8 grid of little color squares in the General Controls panel, you can fill your desktop with tiny stripes, or fish scales, or razor stubble.

But America's programmers laugh at the concept of an 8-by-8 grid of pixels (screen dots). "Ha!," you can virtually hear them scoffing, "we can do better than that! We'll let you make *huge* patterns! We'll turn your screen into digital art that's so breathtaking, you'll feel like a Philistine when a window covers it up!"

I have a natural distrust of anyone who ends every spoken sentence with an exclamation point. Nonetheless, for the second anniversary of this column, I thought I'd survey these ultimate Macintosh personalizers and see what's up. (If you have a modem, you can get the shareware programs in *Macworld*'s America Online area.)

Wallpaper 1.0.2

THE DESKTOP-EDITING CRAZE BEGAN with Wallpaper ($59.99; Thought I Could, 212/673-9724). It's a control panel that lets you choose from 500 patterns to hang on your desktop.

The most awkward aspect of Wallpaper's interface: it's too hard to try out patterns on your desktop (five clicks and a dialog box just to try one). You *can* sample patterns more conveniently, but only with a utility program (included).

The nicest aspect of Wallpaper's interface: you don't have to enter some special window to edit a pattern; you just grab the painting tools right there in the control panel. The window scrolls endlessly to simulate the way your pattern will look on the desktop. Probably as a result of the painting tools' handiness, many of the patterns included with the package look somewhat MacPainty or cartoony, as opposed to the photo-realistic textures found in other programs.

But that's scarcely a deterrent. Because Wallpaper was first on the market, it's had time to spawn thousands of free, user-made add-on patterns (which you can get from services like America Online). You can also buy spin-off products from Thought I Could: the $59.99 Wallpaper Zebra Edition (for black-and-white Macs); a three-disk subscription set ($25); More Wallpaper ($39.99, even though it's the same as the $25 subscription set). And if you're really interested in those photographic-looking patterns (trust me, you are), you can get the breathtaking texture-and-surface collection called Wraptures ($19.95).

JOHN HERSEY

Chameleon 2.0.3

SOME OF THE WISEST WORDS TO DESKtop designers appear in the manual for Chameleon ($59.95; Logical Solutions, 612/659-2495): "Complicated patterns will eventually drive you insane. Multicolored jelly beans does [*sic*] not make a pattern you can stare at for eight hours!" Odd, then, that many in Chameleon's default pattern-set suffer from exactly that busyness.

Fortunately, you also get 125 stunning textures licensed from Artbeats. These amazing photographs make ideal Mac backdrops: slabs of polished marble, jade, and granite of every conceivable shade and density. In all, you get about 240 striking graphics, not one of which could have come from MacPaint.

Chameleon is a double-clickable application, not a control panel or extension. This is my favorite approach; it's easy to get to, and the least likely to conflict with anything. Chameleon also has a mini-MacPaint, so you can touch up patterns you draw or import from Wallpaper. There are only two reasons you might not love Chameleon: its price/pattern ratio and the fact that it modifies your System file (see the sidebar, "Desktop-Pattern Editors and the System File").

ClickChange 2.0

CLICKCHANGE IS A COMplete Mac-environment customizing kit ($89.95; Dubl-Click Software, 818/888-2068). This control panel does more than desktops; it also does windows, menu bars, sounds, cursors, and scroll bars. It colorizes, tweaks, or patternizes them.

Its desktop customizer seems to be modeled on Wallpaper, complete with a built-in scrolling painting window and a randomizer that can change desktops automatically as the day goes by. The 140 patterns are all of the Photoshoppy, high-tech school (that is, more like Chameleon's than Wallpaper's). I found too many of them alike, or at least alike in that they're not as distinctive as those in Chameleon, Screenscapes, or the Wallpaper Wraptures collection. Don't get me wrong; ClickChange is one heckuva great customizing utility. But

continues

anything whose Read Me file lists 36 incompatibilities isn't worth getting for its desktop editor alone.

Screenscapes 1.0

THIS ROLLS-ROYCE OF DESKTOP EDITORS is a beautiful piece of work ($44.95; Kiwi Software, 805/685-4031). Its designers obviously intend to gobble their rivals alive: Screenscapes reads Wallpaper, Chameleon, and ClickChange file formats—in addition to its own 400 patterns and textures, most of them usable, all of them gorgeous. They include some tasteful photo backgrounds of recognizable materials: popcorn, autumn leaves, lace, rose petals, chocolate-chip cookies (for those who love working at the Mac), and a dungeon wall (for those who don't).

Screenscapes is the only program that actually shows you all of your choices, in side-by-side swatches, so you can browse and compare. That's the good news. The bad news is that Screenscapes must compose this "catalog" anew every time you run the program.

Kiwi Software made what's probably a safe assumption: that most people aren't pixel Picassos. Therefore, Screenscapes has no MacPaint mode. Instead, it offers a slew of texture-creation tools that let you generate random 3-D–ish textures, or adjust the color balance, or superimpose repeated clip art elements.

For me, that's all very nice but unnecessary. It'll take me years to get tired of the Screenscapes backgrounds that come ready-made. Heck, I still haven't gotten past those chocolate-chip cookies.

Before Dark 1.0.3

THIS HUGELY POPULAR SHAREWARE application gets the award for the cleverest title ($10; Craig Marciniak, 151 83rd Ave. NE, #305, Fridley, MN 55432). Actually, the title should have been Before Chameleon; the program's 30 rich 3-D textures are the obvious forerunners of Chameleon, its commercial incarnation.

The low price makes Before Dark the perfect sampler if, before springing for a commercial desktop editor, you want to know exactly what you're getting into. Like Screenscapes and Chameleon, Before Dark works only on System 7.

Desktop Textures 2.1

TAKE THE SINGLE-CLICK EFFICIENCY of Before Dark, triple the number of cool textures, and add the ability to import Before Dark and Wallpaper files. The result is the remarkable shareware Desktop Textures (Geoff Adams and Stephen Krauth, 21408 Ridgecroft Dr., Brookeville, MD 20833). The only difference between this program and a commercial one is that this one's easier to use.

There are, so far, three volumes of patterns to download from America Online or another service. Color graphics aren't tiny, mind you; the download takes a while. On the other hand, these guys aren't asking for much as a shareware payment—a postcard or a few dollars, if that.

Silk and Stars This illustration shows two of Desktop Textures' 83 patterns: there's one in the frame, and another texture in the background.

Now Fun 1.0

THESE PROGRAMS GENERALLY CREATE backdrops by repeating a single swatch over and over again. But sometimes, as I often say, 256 pixels square just ain't enough. FunPictures, one of the modules in the Now Fun collection ($69; Now Software, 503/274-2800), takes the desktop-customization idea to its ultimate conclusion: a tile can be as large as your entire screen. You can slap enormous full-color PICT files across your entire monitor—memory and disk space be damned. You can combine multiple images, too: overlap, repeat, move, crop, resize them, as though you're making a collage.

FunPictures is a control panel, so it doesn't modify your System file. And the price is unbelievable, considering all the other Now Fun modules that come with it. Unfortunately, though it comes with a handful of stunning full-monitor pictures, its collection of 33 Wallpaper-style patterns is rather measly. Thank heaven it can import Wallpaper, EPS, MacPaint, PICT, and even Photo CD files.

The Upshot

WHEN YOU GET RIGHT DOWN TO IT, all the features in the world don't do you much good if you don't have terrific, mood-enhancing, super-smooth backdrops to choose from. I therefore nominate Wallpaper for its wealth of available patterns and its painting tools; Screenscapes for its safety to your System, stunning textures, and lower price; Desktop Textures for its low (or no) cost; and FunPictures for its virtuosic versatility.

And now, if you please, I'd like to wrap up this column so I can quit Word and see my chocolate-chip cookies again. **m**

Contributing editor DAVID POGUE is the author of *Macs for Dummies* (IDG Books Worldwide, 1992) and the Mac thriller *Hard Drive* (Berkley Publishing Group, 1993), and coauthor of *Macworld Macintosh Secrets* (IDG Books Worldwide, 1993)—and one very tired guy.

DESKTOP-PATTERN EDITORS AND THE SYSTEM FILE

Until recently, there were only two schemes used by desktop editors. There's the Wallpaper/Now Fun method, where the program is a control panel that does its backdrop-changing when you turn on the Mac. The only drawback is that any extension or control panel increases the potential for conflicts.

Then there's the application method, in which the program actually edits the System file. This method, used by Chameleon, Desktop Textures, Before Dark, and ClickChange, has two side effects. First of all, these programs do something funny to your General Controls panel: it suddenly shows only black-and-white patterns, and the usual row of eight color swatches disappears. You don't get your regular color General Controls panel back again until you use a Virginize or De-Install command in the desktop-editing program.

The second side effect of System-file–changing programs (according to the makers of the Wallpaper-style programs) is that the pattern-installing activity could trash your System file completely if the power goes out at the wrong moment. Then you'd have to reinstall your system software.

There are gray areas all around. Wallpaper also has a command that installs your new pattern directly into the System file, just as the applications do. On the other hand, Desktop Textures and Before Dark offer an alternate, install-into-memory-only method that doesn't touch the System file.

The punch line: Kiwi Software (Screenscapes) has come up with a new scheme, relying on neither a control panel nor a System-file modification. When you turn on the Mac, a tiny application in your System 7 Startup Items folder launches, quick as a wink. It flings your chosen pattern into memory, and then quits. Neat trick.

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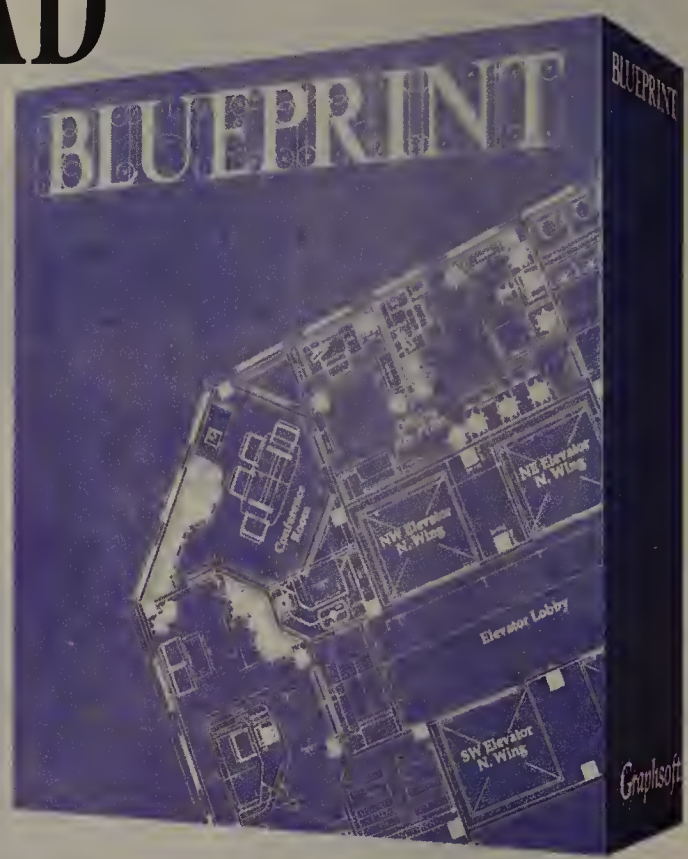

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Shock. Denial. Bargaining. Acceptance. Tech Support.

YOU HAVE MENTIONED SOMEthing about The Trouble. Tell me, please, when did it begin?

Winter. A cold winter day. It was not long after I had installed a new edition of Microsoft Word, which is now rivaling *A Dance to the Music of Time* in its number of new volumes. This, I believe, was version 5.1, known to fans as Word Goes for Baroque. The installation took the better part of a morning. Did I say it was winter?

Yes, you did. Winter.

That's what I remember, a winter morning. Well, that afternoon I was working, and I left my Mac for a few minutes. And when I came back, it was hung.

Hung?

Hung. Frozen. As opposed to crashed. Everything was just as I left it, but I couldn't get anything to happen. I had to turn off the machine and restart it.

I see. Did you lose any work?

No, I saved before I left. So it was no big deal. I mean, Macintoshes hang all the time. And they crash. And you get bombs. This is part of working with a Macintosh. Sometimes, uh, bits happen.

Maybe later we can look into the reasons you feel compelled to use a euphemism.

Ask my publisher. Anyway, I assumed the problem was the new Word. Probably, I figured, Word was messing with my INITs or something.

Tell me more about your INITs.

You know what INITs are—little programs that don't really turn off but stay in the background. Apple calls them extensions under System 7, but everyone else calls them INITs. After you install them, they automatically load into the Mac's memory—when you start up the machine, their icons appear on the screen like tiny coming attractions. And they wake up when you call on them to do things. Sometimes they get triggered by a predefined period of inactivity. After five minutes with no events, for instance, my screen saver kicks in. The problem is that if you have a lot of them, two INITs might try to scrunch into the same patch of memory, and then you've got an ugly turf battle. It's like *West Side Story* in RAM.

I had a lot of INITs on my machine. I had recently installed Now Utilities, which has a bunch of them (including one that supposedly prevents conflicts between dueling INITs). My collection also included INITs for the file finder On Location, the screen saver After Dark, the compression program SpaceSaver, Adobe Type Manager, QuickTime, a CD player, and even something that acted like a virtual light on a hard drive.

Anyway, I restarted my machine, and later that day, when the computer was idle for a few minutes, the same thing happened. I restarted, and purposely left the Mac alone for a while. After about ten minutes—I didn't clock it exactly because I got involved playing solitaire on my PowerBook—my Mac froze again. The Trouble had begun.

So did you decommission the INITs?

Not right away. Believe it or not, I tried to ignore the problem. For about a week, I took pains not to leave the computer for more than ten minutes. If I didn't make it, it would hang again, and I'd have to restart. I know it sounds nuts, but you can get used to almost anything.

Certainly you didn't get used to The Trouble?

Well, I hated it, but the thought of trying to deal with it was exhausting. And I was very busy. I thought of wiping out Word 5.1 and going back to 5.0, or even one of the 4's. But that was too horrendous to consider—all that disk swapping. Did I tell you I'm developing a phobia about the Install program?

No. [Writes something down in notebook.]

And then, something even weirder happened. Everything got incredibly slow, especially when I was using the Finder. I would click on a file and it seemed like eternity before it opened. I called this the Molasses Syndrome. The craziest was when I would shut down. Nothing would happen for about 30 seconds—*then* it would shut down. What was happening during that time lapse? Was the Mac calculating something it had forgotten? Was it crunching some algorithm that held the key to the universe?

You're anthropomorphizing.

So I thought, maybe this is a virus. I did a little cleanup—I built the desktop to get rid of any WDEF virus, which my Mac periodically comes down with. That didn't help. A virus-detection program showed no virus.

So I was stuck—the only thing I could think of was to unload the INITs one by one. First the ones I had no need for anyway. The computer still hung. Then the ones I didn't use often. No difference. I turned off the background printing, thinking maybe *that* was it. It wasn't. So I said to hell with it, and turned off everything, even stuff I rely on. *Boom*—there went After Dark, On Location, SpaceSaver (now I can't read my compressed files), Type Manager, and all the Now Utilities.

And?

The Trouble seems to have stopped.

Are you happy?

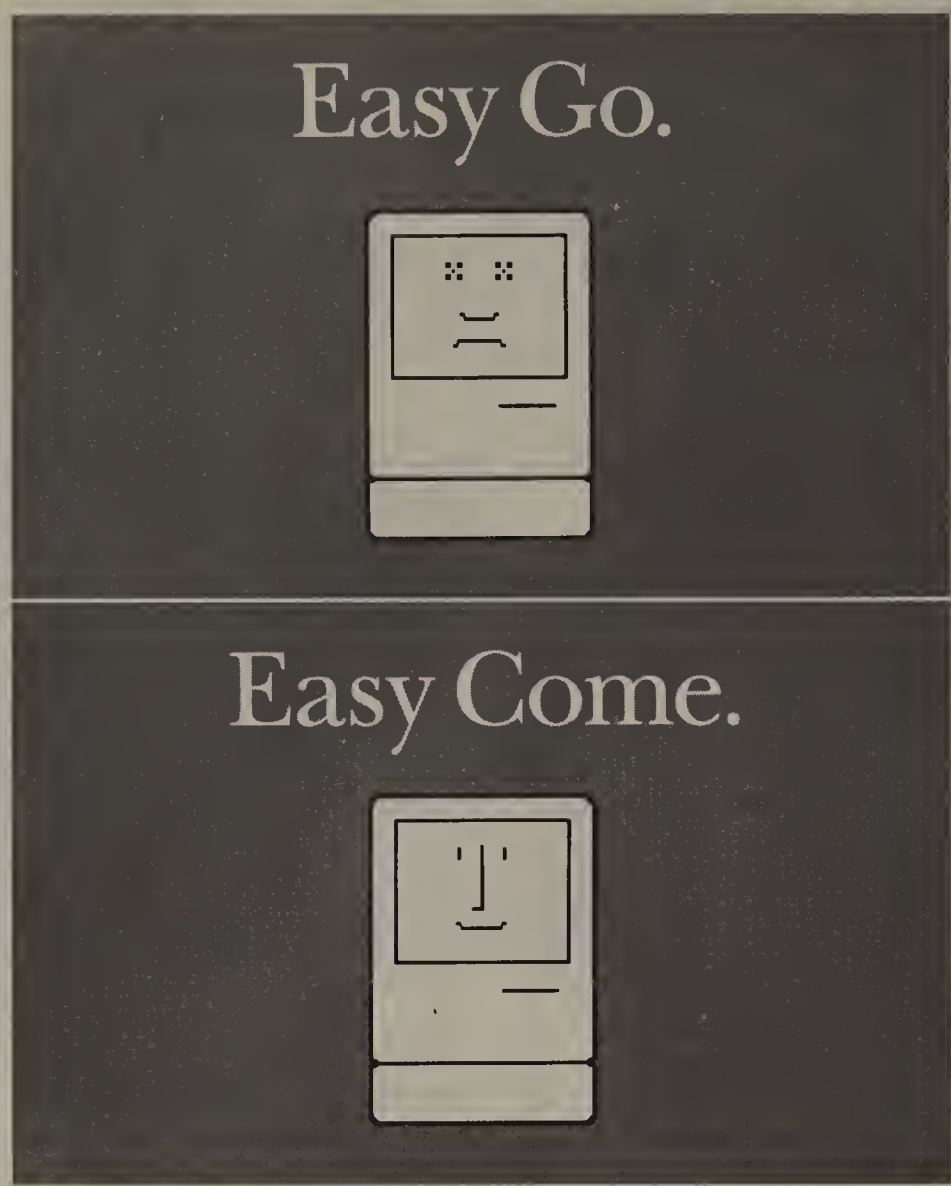
I'm miserable. I've come to depend on those things I got rid of.

So you are going to reinstall them, one by one, and get to the heart of The Trouble?

Yes. I mean, no. I mean, not now.

continues

SCOTT BALDWIN



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You seem hostile.

Look, I want to find out what's the matter with my Macintosh, but I don't know whether it's the Mac, the system, the application, the INITs, or any or all of these things. I know as a diligent user—and as a computer columnist, for heaven's sake!—I should find out. But I'm busy right now. And to be honest with you . . .

Please . . .

I'm absolutely infuriated at the entire situation. Computers are supposed to work *for me.* I'm not supposed to work *at them.* How did things get so complicated? So I've had it. I'm going to leave my Macintosh stripped down, do what I have to do, and simply get by. Day by day.

Ah. But sooner or later, you know you will have to find out the source of The Trouble.

[Long pause.] Yes, I know. [An even longer pause.] But can't it wait? Please?

Three Months Later

You seem more relaxed today.

Why not? It's almost summer.

You have something to tell me?

The Trouble is gone! It was unbelievably easy. As we agreed, I would slowly turn on everything I'd shut off, and if The Trouble came back, I would call every support person for every software company until I figured out what was wrong. But I didn't even have to go that far.

The first thing I turned to was On Location. But I couldn't get it to work. When I selected the program on the menu bar, it kept telling me there wasn't enough memory—I had 8 megabytes and no applications open and no memory. Then I tried to reinstall it from the original floppy. The installation went fine, but when I tried to index the hard disk, after 14 minutes it got stuck. The little hands of the clock cursor kept spinning, as if it were in one of those time-travel movies.

Mmm.

So I called On Technology.

Was it an 800 number?

No, but I got a receptionist right away, and she connected me to a tech-support person who identified himself as Rob. He was great. He told me that the problem with the new installation was that I hadn't gotten rid of all the old files, particularly the preference files.

They can be nasty.

Yeah, this folder just appears out of nowhere, with preference files for all sorts of programs. Even when you get rid of a program, its preference file hangs on, sort of a ghost of applications past. Spooky. Anyway, Rob also informed me that there was a problem with something called MacLink files, which I had on my hard disk. And then . . . well, I asked him about

continues

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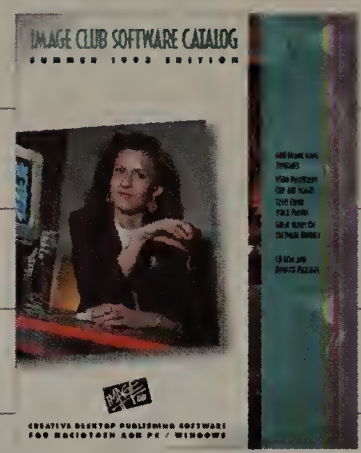

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The Trouble. And you know what? He said he thought he knew what was wrong!

Did he?

He told me to go to the Claris file in my System Folder, another one of those things that's just there. Well, that folder is full of filters created by Claris to help exchanges between programs. It turns out that On Location uses those whenever possible. And there were good filters for previous versions of Word, like 3.0 and 4.0. But none for versions of Word that began with 5. While Version 5.0 didn't cause trouble, apparently those previous filters didn't work well with Word 5.1, and when On Location caught up on its indexing—a few minutes after the computer was idle—the computer could freeze! The nub of The Trouble! Rob told me if I simply got rid of the old filters, the problem would be solved. Also, for some reason something called Employment Report, one of the Sample Files that comes with Word 5.1, also caused weird things to happen. He told me to nuke that, too. Then I reinstalled all the other INITs. Everything was fine. I've now got a list of extensions under the Apple menu as long as a loaf of Italian bread, with no problems. I've got Super Boomerang back.

And now you are happy.

Yes. [Pause.] No.

Things are different from before, yes?

Yes. I'm scared. There's an incredible amount of things going on inside my Mac that I don't know about. And when something goes wrong, I can't necessarily pinpoint the problem. I got lucky in this case—there was a nice tech-support person who knew what the problem was. I'm worried about next time. Who knows whether that other thing, the Molasses Syndrome, will come back.

Did you ever find out what caused that?

No, and I don't want to know. I just don't want it to happen again. How many calls will I have to make then? What if I have to reinstall System 7? Maybe I'll even have to wipe my hard disk clean and start over! The thought of it makes me . . . it makes me . . . [Takes a tissue.]

Let it out.

I thought my Macintosh was a friend! Does a friend freeze up and refuse to move its cursor? I don't know what to do. I had a dream the other night where all my telephone speed-dialing numbers were those of various tech-support lines. Apple, Microsoft, Claris, Adobe . . . I woke up screaming. [Long pause, then speaks in very small voice.] I think I need help.

[*Very long pause. Takes out Volume 1 of* Inside Macintosh.] *Now we can begin.* m

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CONSPICUOUS CONSUMER

BY DEBORAH BRANSCUM

Preventing Software Piracy

How managers can stop software theft

ACCORDING TO COPYRIGHT law, software owners may load one copy onto their hard drives and make a second for backup. That's it. Like it or not, making any more copies is illegal. And while individuals can probably get away with it at home, it's increasingly risky to use stolen software at work. As more than 200 companies found out in 1992, pirating software can be much more expensive than simply buying legal copies of the software they need. Targeted for investigation by the Software Publishers Association (SPA), one firm paid a record fine of $500,000; others paid smaller fines but shouldered the costs of lawsuits as well.

Targeting Corporations

THE SPA BEGAN ITS CRACKDOWN ON software theft in the late 1980s; a toll-free hotline encourages company insiders and former employees to report corporate piracy. And report they do by calling between 10 and 30 times per day. From those reports the SPA creates a list of candidates for investigation and action.

In 1992 the SPA took action against 747 companies. Roughly 520 cases involved sending cease-and-desist letters asking organizations to voluntarily destroy illegal software and purchase legal copies; 219 cases involved audits and lawsuits that resulted in fines or judgments. (Ninety-five percent of these cases involved corporations; the rest were made up of BBSs and educational institutions.)

Between a lawsuit and an audit, the latter is much less painful; if it appears that a company will cooperate, the SPA asks for permission to audit, or search, the company's computers for illegal software. The results of a voluntary audit are confidential; if illegal software is found, the SPA asks the company to pay twice—once for the illegal copies, which are destroyed, and a second time to buy legal replacement copies.

"Most companies that receive an audit letter cooperate with us," says Ilena Rosenthal, general counsel for the SPA. "Those who don't, we sue." That's not an idle threat; with one exception, the SPA has won settlements or judgments against every company it has taken to court. And courts routinely allow the SPA to raid organizations suspected of pirating software. "The reason courts allow us this fairly unusual remedy is that it's so easy to destroy the evidence," says Rosenthal. That means posting a U.S. marshal inside an office to guard against the wholesale reformatting of drives while SPA folks go from cubicle to cubicle, looking for stolen software. In one case, says Rosenthal, "The U.S. marshals were on floor one, while the MIS manager was erasing hard drives on floor two."

Going Legit

ESTABLISHING A SYSTEM TO AVOID audits is fairly straightforward, though it

does require money, time, and will. The money part is obvious; managers simply must budget for the software their businesses need. Federal Express doesn't deliver for free; neither does Microsoft.

In addition to money, a little time and a certain amount of will are required to eradicate stolen software, buy legal copies, and guard against the reappearance of illegal copies. To begin, managers should make an inventory of all the software programs that exist in the organization, destroying illegal copies, and purchasing legal copies of any software that's needed.

The SPA tries to ease the process by providing a free inventory program, called SPAudit, which comes in both DOS and Mac versions. The price is right, but the program has its quirks; you can't use it over a network, and it sometimes misidentifies files as programs.

SPAudit is fine for small companies, but it's not convenient for dealing with lots of networked machines. In those cases, using a commercial product to scan hard drives across a network is a lot easier. Several programs are available, including Status Mac from On Technology (617/876-0900) and Network SuperVisor from CSG Technologies (412/471-7170), which let managers scan networked Macs to learn what applications, INITs, and system versions they are running, among other information. A 25-user version of Status Mac lists for $749 ($2699 for 100 users); a 50-user version of Network SuperVisor lists for $795.

Once you've audited the machines, check the number of copies of each program you find against company records of software purchases (including registration forms) to see if any illegal software exists.

You say you can't piece together a paper trail? You're hardly alone. Fact is, few companies designate an individual to be responsible for tracking software assets. That's why the number one recommendation on the SPA's program for keeping a company legal is to appoint a software manager. That person implements the company's software policy, maintains purchase records, and oversees employee compliance.

Other recommendations include the following:

- Establish procedures for acquiring and registering software. That includes deciding what the company needs; planning and budgeting for purchases; regis-

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SERVICE HEROES

Reader Elaine Truver of Chicago writes to nominate mail-order company MacWarehouse and shipping company Airborne Express as service heroes for turning a bad situation into a good one. Truver ordered four software programs and a clip art package on a Thursday night after being assured they were all in stock and would arrive the next day before 5 p.m. "Based on that, I committed delivery of a new client's project for the next Monday morning," writes Truver. When no package arrived by 4 p.m. on Friday, she called MacWarehouse. It turned out that two of the four programs were actually out of stock, and the others were being held until the entire order was available.

When Truver explained her plight to MacWarehouse, reps said they would call their supply depots and get back to her. And they did, within an hour. "They also gave me all pertinent shipping numbers and the number of my local Airborne Express office so I could have the material delivered to me at my home instead of my office on Saturday. The order arrived in three separate boxes, at three different times, but all on Saturday, thanks to the coordination of the folks at Airborne."

Truver writes that "both companies spent a couple of hours each to correct the problem, with no impatience, many apologies, and great dedication."

tering software; and giving users access to manuals and other documentation.

- Establish and maintain a software log. At its most basic, that log should list each package the company owns and the computer it runs on. The SPA suggests tracking each package's serial number, purchase terms (site license, other discounts or deals), the date of purchase, and where the program was purchased.
- Conduct periodic audits. When it comes to staying legal, annual or twice-yearly audits are the only way to know if employees are complying with software policies.
- Establish an employee education program. Employees can't comply with

continues

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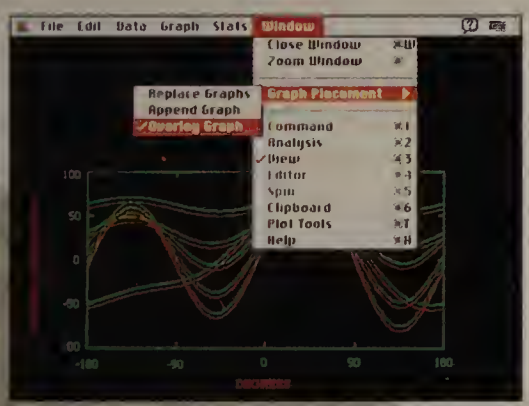

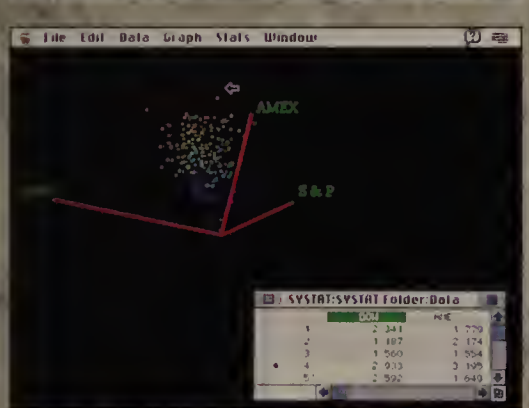

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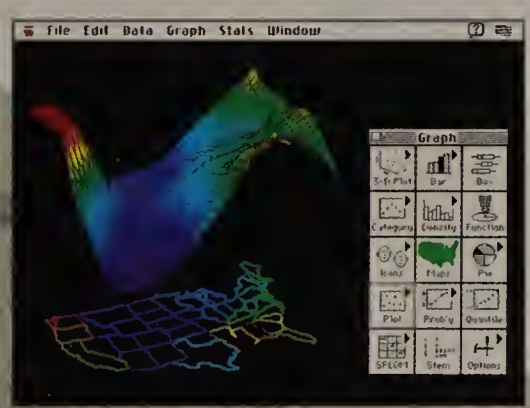

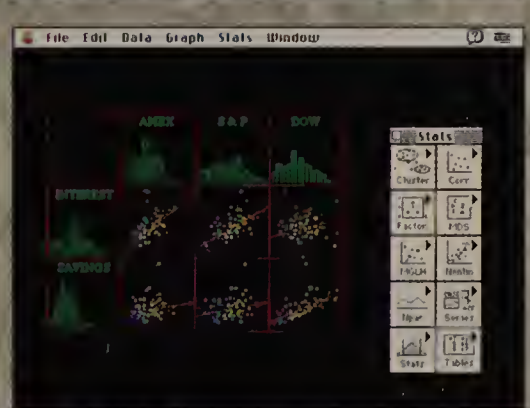

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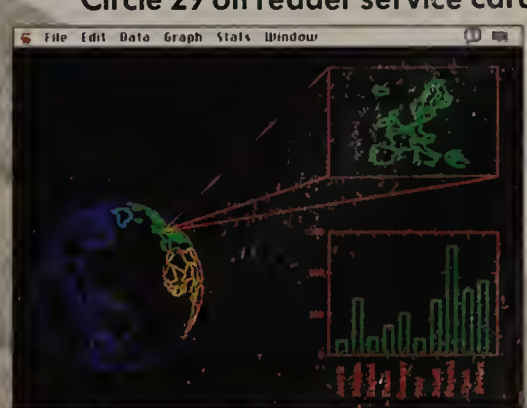

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policies unless they know what they are. One way to teach them is to establish a written software code of ethics, which the SPA recommends employees sign annually. The SPA also suggests including a section on software piracy in orientation programs, to inform new employees that it is illegal—and against company policy—to violate software copyright.

• Maintain a library of software licenses. Some software companies allow users to keep one copy of a program at work and one at home, as long as the two are never used concurrently; other companies require a separate, purchased program for every machine.

Successful Campaign

THE SPA'S STRONG-ARM TACTICS MAY be getting its point across, at least at large corporations. Early in its antipiracy campaign, the SPA received many calls about Fortune 500 companies; now the focus has shifted to smaller companies, according to SPA public relations manager Terri Childs. Childs says the software industry's estimated losses from piracy have dropped from an estimated $2 billion in 1990 to $1.2 billion in 1991. Even so, this year the SPA is averaging between two and eight audit or lawsuit actions per week.

Rules to Remember

THE *SOFTWARE MANAGEMENT GUIDE*, SPAudit, and other materials can be ordered from the SPA at 202/452-1600 or 800/388-7478. The $80 guide includes a survey for assessing internal company controls, a software audit worksheet, a sample software code of ethics, and a 12-minute video about piracy called "It's Just Not Worth the Risk."

"Software is a hard asset to control," notes the SPA's Rosenthal. But you can toe the line by simply destroying all illegal software and buying legal copies of the software you need. That should make employees happy too—now they can look in the manual for answers instead of pestering the in-house Mac gurus for help.

Stealing is an American tradition, as both software companies and Native Americans can attest. But so is old-fashioned capitalism, where entrepreneurs risk their shirts to bring us better products. If you're a manager, give your employees the tools they need to do their jobs so they don't feel compelled to pirate. If you're an employee using pirated software, ask your boss for a legal copy. m

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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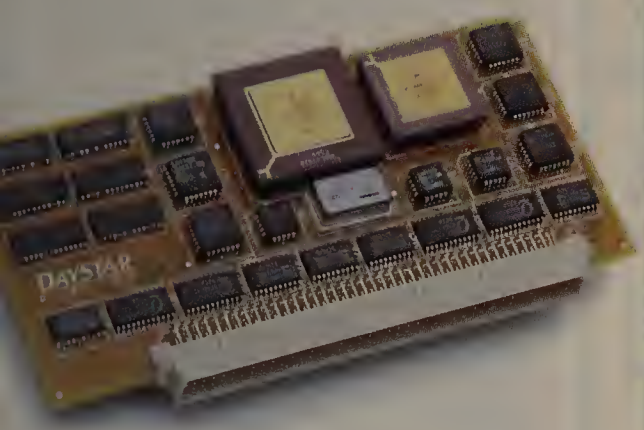

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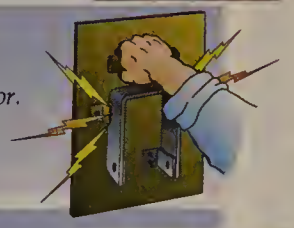

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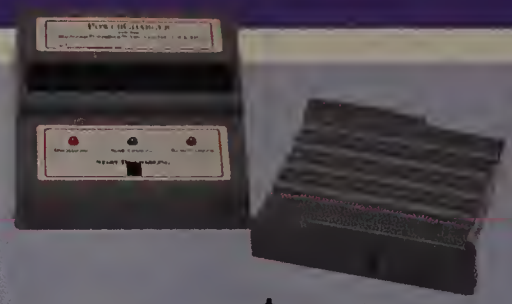

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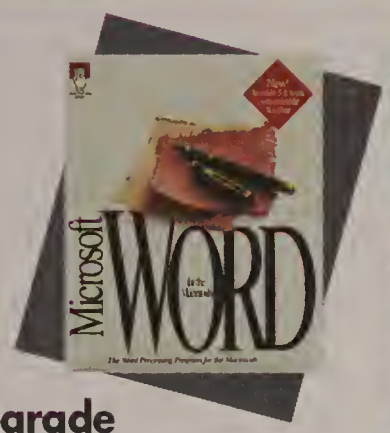

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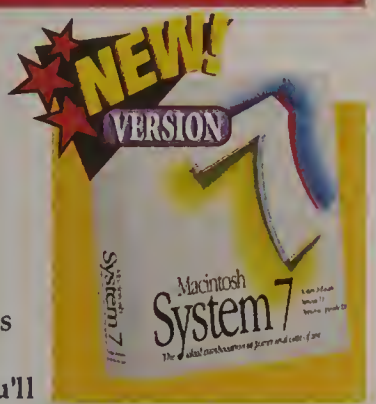

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04140	MacProject Pro	$398.00
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04046	More After Dark 8ndl 2.0	$38.98
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00427	MS Dffice 3.0	$474.00
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00567	MS Works 3.0	$158.00
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00642	PowerPrint 2.0	$94.98
04736	QuarkXpress 3.2	$588.00
00853	Quick Art Dix CD-RDM	$218.00
04230	Quicken 4	$44.98
00116	Sam 3.5	$64.98
04768	SoftPC Professional 3.0	$198.00
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05702	Adobe Premiere 3.0 Upgr	$148.00
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05493	Aldus Personal Press 2.0	$98.98
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06850	Auto Doubler/Disk Doubler 8ndl	$84.98
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04776	Suitcase II 2.1	$49.98
05679	Super 7 Utilities	$62.98
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04956	A.E. Plus Drive - 1.44/800	$298.00
05628	Axion Serial Switch	$128.00
06654	Daystar 33MHz Turbo 040 For Mac CI & SI	$1,438.00
04322	Daystar Universal PowerCache 50MHz / FPU	$898.00
05684	Global Village PowerPort Gold	$398.00
06267	Global Village TelePort Gold	$378.00
05176	Kensington TurboMouse 4.0 Trackball	$110.00
06251	Microtek Scanmaker II	$928.00
06252	Microtek Scanmaker IIXE	$1,214.00
05849	NEC CD Express Mac W/ CDR 25	$349.00
06722	NEC Multispin CDR 74-1	$636.00
06701	NEC SilentWriter M95F	$1,349.00
05393	6M8 Power8ook 140, 170	$278
06692	10M8 Power8ook 160, 180	$498
05653	1M8x8 - 80ns 2 Pack	$88.98
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05654	4M8x8 - 80ns 4 Pack	$636
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06729	4M8 - 70ns 72 Pin	$158
06755	8M8 - 70ns 72 Pin	$318
06808	16M8 - 70ns 72 Pin	$598
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06215	Performantz 105M8 Ext	$358
06222	Performantz 105M8 Int	$216
06576	Performantz 14.4 Ext Fax/Modem	$249
06575	Performantz 24 / 96 SR	$119
02181	PLI Infinity 40 Turbo HD	$525
06547	PLI Infinity 88 / R-W 44	$719
00182	PLI Infinity 88 Turbo HD	$648.00
04698	PLI Infinity Dpt Sony 3.5" 128M8	$1,549.00
06546	PLI Toshiba CD ROM Drive Multisession	$699.00
06022	Power8ook 8attery 140, 170	$62.98
00062	Promethus Promodem 144 Ext	$268.00
06552	Radius PrecisionColor Pivot	$998.00
05250	Radius Rocket 33	$1,588.00
05650	Radius VideoVision	$2,098.00
05117	Supermac Spectrum / 24 Series IV	$872.00
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05123	SuperMatch 17 Multimode Color	$999.00
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00413	Supra Fax Modem V.328IS w/ Sft Cable	$293.00
00414	Supra Fax Modem V.328IS w/o Sft Cable	$249.00
02183	Sydos Syquest 44M8 Cartridge	$69.98
00183	Sydos Syquest 88M8 Cartridge	$106.00
04096	TI PS 17 MircoLaser	$1,198.00
06904	Umax UC 840 Scanner w/ Photoshop 2.5	$1,444.00
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05660	4M8x8 - 80ns FX 4 Pack	$672.00
05819	4M8x8 - PAL II or IIx 4 Pack	$672.00
05354	A.E. Full Cycle Power8ook 8attery Charger	$104.00
05689	Altec ACS300 Speaker System w/ Sub WFR	$298.00
00847	Asante EN/SC	$328.00
03642	Asante MC+IIET64 for Mac II Performa 600 TK/10T	$155.00
00511	Asante MC3N8 for Mac II Performa 600 TN/TK/10T	$218.00
01584	Datadesk Mac 101E Keyboard	$125.00
04318	DataDesk Mac 101e Keyboard w/Quickeys II 2.1	$149.00
00321	Dayna Etherprint Plus 4 Dev	$449.00
00322	Dayna Etherprint T Plus 4 Dev EP0421	$449.00
06653	Daystar 25MHz Turbo 040 for Mac CI & SI	$1,189.00
06478	Daystar 33MHz Turbo 040 for Mac II, IIx, IIcx, SE/30	$1,438.00
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05700	PSI CDMstation Five High Speed Fax Modem	$439.00
05496	Radius Precision Color 24XP	$538.00
04899	Radius Precision Color 29" Display	$2,489.00
06717	Radius Video Vision #0417	$2,098.00
04118	RasterOps 24XLI	$2,048.00
06721	RasterDps Movie Pack	$1,708.00
06591	Sharp Wizard 9600 Pen 8ased Org 256 K8	$494.00
04038	Shiva FastPath 5 Thick / Thin	$1,768.00
06101	Shiva LanRover / 4E (Apple Talk)	$1,758.00
00571	Sigma Granite Power Portrait 15"	$658.00
00399	Sigma Platinum Power Portrait 15"	$658.00
05270	Solid Wood Stackable Disk Holder (140 3")	$25.98
06404	Sony 3.5" Rewrite M.O. 512 8yte/Sec 128M8	$59.98
06413	Sony 5.25" Rewrite M.D. 1024 8yte / Sec 650M8	$135.00
05068	Stylewriter Ink Refill 8lack 2 Pack	$14.98
06476	Supermac SuperView	$364.00
06234	SuperMatch 20 T Multimode Trinitron Color Display	$2,698.00
04351	Supra Fax Modem Plus	$149.00
06363	Targus 8usiness Traveler - Standard Version	$198.00
06610	Targus Leather Power8ook Case	$100.00
06023	Targus Notepac Case 8lack	$35.98
05284	Targus Premier Leather Notebook Case	$138.00
07454	Targus Universal Notebook Case	$68.98
04666	Texas Instruments Toner Kit	$47.98
02212	Thunderware Lightning Scan 400	$318.00
00520	Thunderware Lightning Scanner Pro 256	$458.00

If you are calling from one of these countries you can contact our international offices at:

- Belgium–322 520 3037 ..... Fax: 322 5201616
- Denmark–45 8622 8366 ..... Fax: 45 8622 7096
- France–33 14613 4740 ..... Fax: 33 14790 6903
- Hong Kong–852 8511750 ..... Fax: 852 581-0359
- Mexico–525 611 4646 ..... Fax: 525 611 0694
- Sweden–46 8665 0990 ..... Fax: 46 8661 5070

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- All major credit cards accepted. No surcharge.
- Credit card not charged until order is shipped. If we must ship a partial order, freight is not charged on back order (USA only).
- Most personal and company checks received by mail clear immediately. All checks or purchase orders must have a phone number and contact person listed.
- A $20 fee will be charged on all returned checks.
- C.O.D. orders accepted: limit $1,000 per order. Cashier's check or money order only. Add $5.00 per C.O.D. order.
- Educational, government and corporate purchase orders accepted.
- All U.S. shipments insured at no extra charge. All products covered by 120 day limited warranty.
- No sales tax, except applicable sales tax in WA and OH.
- Prices and product availability subject to change without notice. All specials and promotions limited by availability. Call for current prices.
- All shipments refer to items in stock, barring system failure, etc.
- Shipping: $3 per order for delivery in the USA via Airborne Express overnight service. (Some rural areas require extra day for delivery). Canadian customer orders, in most cases, delivered within 24 hours. Call for complete information.
- Drders placed by 2 a.m. ET weekdays ship that day.
- Drders placed Saturday by 9 p.m. ET ship to arrive Monday.
- APO/FPO box orders shipped first class U.S. Mail. Shipments to P.D. Boxes via UPS.
- Competitive upgrades require proof of purchase of qualifying software.
- Not responsible for typographical errors.
- **Defective software replaced immediately. Hardware repaired or replaced at our discretion.**
- **Return Authorization Number must be obtained prior to returning any item. Call Customer Service Hotline: 1-800-248-9948 weekdays 6 a.m. to 6 p.m. PT.**

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WordPerfect Corporation *#03972*

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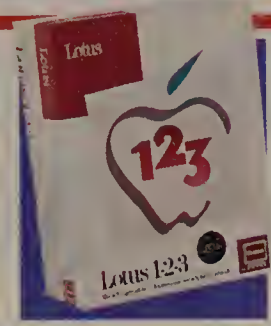
- It combines special effects art tools, picture stamps, sounds and more
- Ideal for children 3-10 years old

Brøderbund/Edmark *#06550*

$119



Lotus 1-2-3 for Mac w/Snooper Tested & DiskLock 2.1

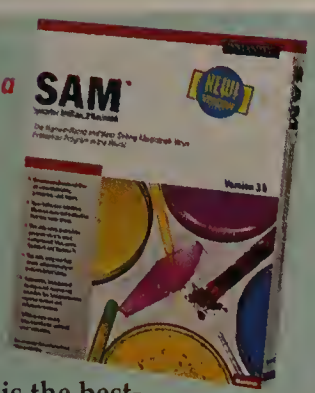
- Work more efficiently with Lotus 1-2-3's powerful new spreadsheet functions
- Copy a cell or range down a row or across columns.
- Send your spreadsheets across a network, System 7 required

Lotus *#99755*

#00507 Lotus 123 1.1 Mac ... $298

Don't lose your valuable data to a computer virus.

$64.98



SAM 3.5

Make no mistake, it happens! SAM is the best-selling, highest-rated virus protection, detection and repair program for the Macintosh. It intercepts viruses, scans and repairs files, combats known and unknown viruses, scans compressed files and is fully networkable. It works behind the scenes, checking every application as it is launched.

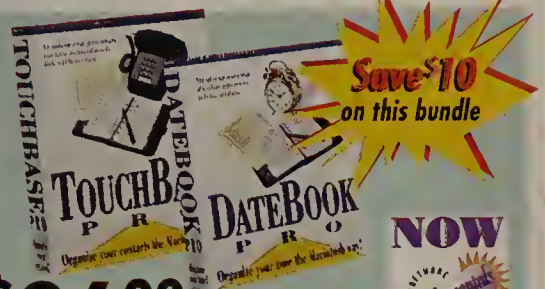
Symantec *#00116*

Aldus SuperPaint 3.5

$98.98

- New plug-in tools and an expanded selection of templates
- Pressure sensitivity/tilt sensitivity support (Wacom and Calcomp)
- 5 sample textures from Gallery Effects texture art, and more!
- System 7.0 savvy

Aldus *#04190*



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- Use Mac USA as an atlas or as a reference tool
- Statistical data on population, income, education and much more.

Broderbund *#05479*

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- Puts your favorite files at your fingertips
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DOS

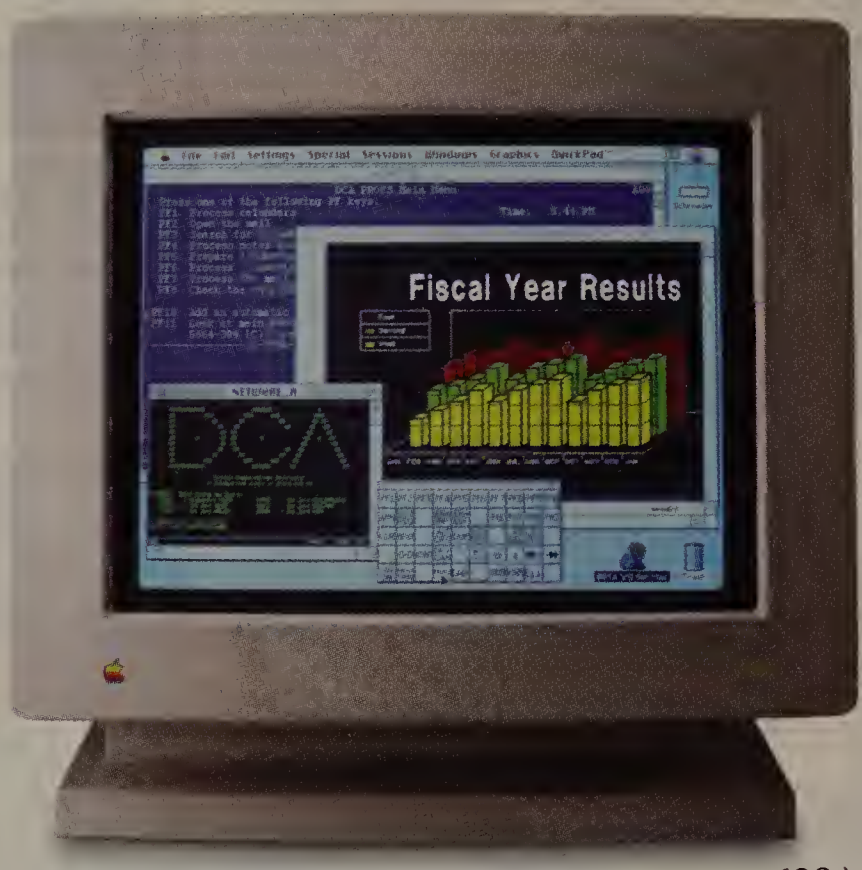
MACINTOSH

IT MAKES WORKING WITH YOUR HOST A COLLABORATION. NOT A COMPROMISE.

When it comes to friendliness and ease of use, a mainframe is the antithesis of a Macintosh.® But with IRMA™ WorkStation for Macintosh, your Mac® can become a full partner with your host, creating a powerful synergistic collaboration.

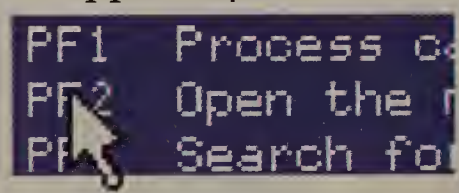
IWM now supports NetWare for SAA.

IRMA WorkStation for Macintosh now adds NetWare for SAA® and TN3270 over TCP/IP support to an already impressive list of connectivity options. It includes productivity enhancers like KeyStroke Macros, to automate common tasks; QuickPad™ and QuickHit,™ for point-and-click navigation of host applications; and QuickPoints,™ to simultaneously resize screen and fonts.



QuickPad, QuickHit and QuickPoint productivity enhancers, multiple sessions, APA graphics and full System 7 support are just a few of IWM's strengths.

The recent merger with Avatar® has further strengthened DCA's commitment to the Mac marketplace. And now, our combined resources are focused on advancing the most comprehensive suite of Mac connectivity products ever. In fact, we offer the only complete line of Mac-to-host software and token-ring and coax hardware. As well as the only family of micro-to-host solutions for Mac, DOS, Windows™ and OS/2.®



QuickHit lets you execute PF keys with a click.

Until August 31, you can trade up to IWM from an earlier version–or any competitive product–for only $95. (That's $330 off the suggested retail price. And the price can be even less, when you buy MultiPaks of 10, 50 or 100.) You can also call for free demo disks and our new *Mac-to-Mainframe Connectivity Guide.*

So stop compromising. Call **1-800-348-3221, ext. 40G***, and become part of a powerful collaboration.

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HOST CONNECTION: CUT, DFT, 802.2, TN3270 over TCP/IP.

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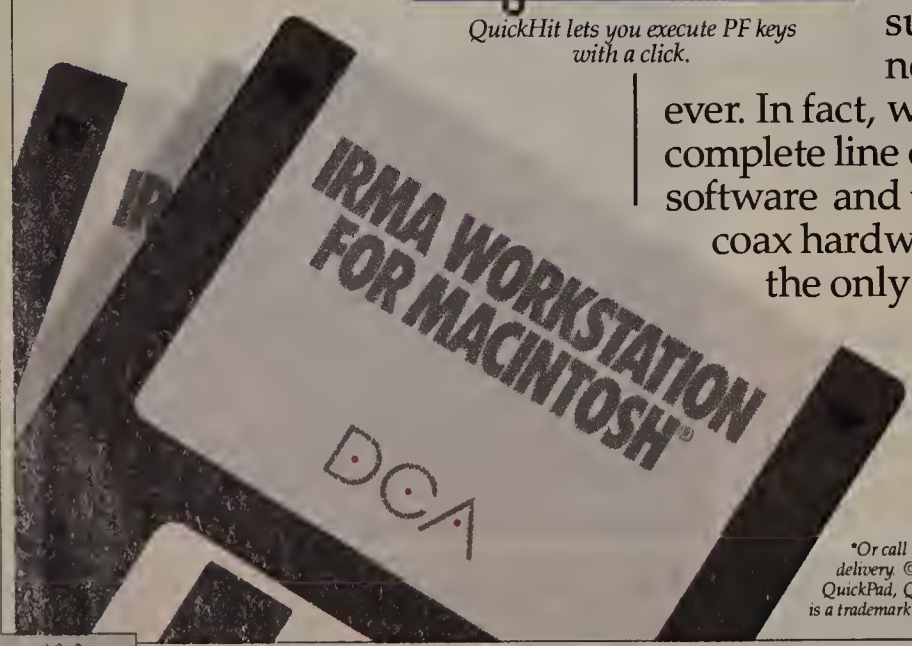

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**Or call (404) 475-8380 if outside the U.S. and Canada. Upgrade good in U.S. and Canada only, through 8/31/93. Allow 6-8 weeks for delivery.* *©1993 Digital Communications Associates, Inc. All rights reserved. DCA and IRMALINK are registered trademarks and IRMA, QuickPad, QuickHit, QuickPoint, FT/Express, IRMALAN and Select are trademarks of Digital Communications Associates, Inc. Windows is a trademark of Microsoft Corporation. All other trademarks are property of their owners.* ***Coming soon. †With Avatar's MacMainFrame.*

OS/2

WINDOWS

Circle 22 on reader service card

Editors' Choice

THE BEST PRODUCTS FEATURED IN MACWORLD

Edited by Wendy Sharp

Macworld Editors' Choice is a complete listing of the hardware and software products selected as the best of their type in *Macworld*'s comparative articles through the past year. A ✣ next to a product indicates that we chose more than one product in that category.

Hardware

MONITORS

BLACK-AND-WHITE MONITORS, May 93
Portrait monitor: 15-Inch Gray Scale Portrait Display; Mirror Technologies, 612/633-4450; $399, with video-display board $549.
Two-page monitor: ✣ L-View MultiMode; Sigma Designs, 510/770-0100; $1099, with video-display board, $1398. ✣ MD 202 Two Page Display; Mobius Technologies, 510/654-0556; $699, with video-display board $798.

GRAY-SCALE MONITORS, May 93
Portrait monitor: Pivot Display; Radius, 408/434-1010; $849, with video-display board $1148.
Two-page monitor: MultiMode 120, SilverView Pro; Sigma Designs, 510/770-0100; $1099, with video-display board $1299.

COLOR MONITORS, Sep 92
16-inch: T16 II; E-Machines, 503/646-6699; $1699, with Futura MX video board $2198.
19-inch: PrecisionColor Display/20; Radius, 408/434-1010; $3299, with PrecisionColor 8x video board $4198.
21-inch: ✣ SuperMatch 21 Two-Page Color Display; SuperMac Technology, 408/541-6100; $3649, with Spectrum/8•24 PDQ video board $4648. ✣ MultiSync 6FG; NEC Technologies, 708/860-9500; $4398 (includes MacFG video board).

NETWORK HARDWARE

HARDWARE ROUTERS, Jul 93
Under $1500: EtherRoute; Compatible Systems, 303/444-9532; $1495 base model (no TCP/IP support).
Between $1500 and $3500: InterRoute/5; Farallon Computing, 510/814-5000; $3299 to $3499.

POWERBOOK TOOLS

DUO DOCKING CONNECTORS, Feb 93
PowerLink DeskNet; E-Machines, 503/646-6699; $699.

EXTERNAL HARD DRIVES, Feb 93
✣ Companion 120; APS Technologies, 816/478-8300; $599.
✣ PocketDrive 120MB; La Cie, 503/520-9000; $699.

INTERNAL FAX MODEMS, Feb 93
✣ PowerModem series; PSI, 408/559-8544; $195 to $495.
✣ PowerPort series; Global Village Communications, 415/390-8200; $229 to $499.

SCSI MONOCHROME MONITORS, Feb 93
Power Portrait; Sigma Designs, 510/770-0100; $749.

PRINTERS

PERSONAL PRINTERS, Sep 93
Ink-jet: StyleWriter II; Apple Computer, 408/996-1010; $359.
PostScript laser: TI microLaser Series; Texas Instruments, 512/250-6679; $1199 to $1599.
QuickDraw laser: LaserWriter Select 300; Apple Computer, 408/996-1010; $839.

WORKGROUP PRINTERS, Jan 93
Basic printing: microLaser XL Turbo; Texas Instruments, 512/250-6679; $3649.
High-speed office printing: Pagemarq 20; Compaq Computer Corp., 713/370-0670; $5699.
Duplex printing: LaserJet IIISi; Hewlett-Packard, 800/752-0900; $6995.

COLOR PRINTERS, May 93
Dye-sublimation:
✣ ColorStream/DS; Mitsubishi International, 408/980-1100; $9950. ✣ Phaser IISD Color Printer; Tektronix, 503/682-7377; $9995.
Thermal-wax:
✣ ColorScript 210; QMS, 205/633-4300; $4995. ✣ Personal ColorPoint PSE; Seiko Instruments, 408/922-5800; $2999.
Low-end liquid-ink: HP DeskWriter 550C; Hewlett-Packard, 800/752-0900; $1099.
Midrange liquid-ink: HP PaintJet XL300; Hewlett-Packard, 800/752-0900; $3495.
Solid-ink: Phaser III PXi Color Printer; Tektronix, 503/685-3585; $9995.

SCANNERS

SLIDE SCANNERS, Oct 92
✣ LS-3510AF Film Scanner; Nikon, 516/547-4355; $9535 for 8-bit option, $11,316 for 12-bit unit. ✣ LeafScan 35; Leaf Systems, 508/460-8300; $9995.

SYSTEMS/STORAGE

CD-ROM DRIVES, Oct 92
High-performance: InterSect CDR-74; NEC Technologies, 708/860-9500; $712.
Budget choice: Mirror CD-ROM Drive; Mirror Technologies, 612/633-4450; $599.

DOUBLE-SPEED CD-ROM DRIVES, Jul 93
Sheer speed: Pioneer DRM-604X; Pioneer, 408/988-1702; $1795.
Overall value: AppleCD 300; Apple Computer, 408/996-1010; $599.
Budget choice: NEC MultiSpin 38; NEC Technologies, 708/860-9500; $465.

LOW-CAPACITY HARD DRIVES, Aug 92
Desktop drive: ✣ APS External 105MB; APS Technologies, 816/478-8300; $449. ✣ Mirror 105MB External; Mirror Technologies, 612/663-4450; $479.
Portable drive: Liberty 50 105Q; Liberty Systems, 408/983-1127; $899.

HIGH-SPEED HARD DRIVES, Aug 93
1GB drives: ✣ Edge 1000r; Saturae, 617/661-8166; $1499 ✣ MiniPak 1000; Optima Technology, 714/476-0515; $1995.
2.7GB drives: ✣ Nova XL 2700; Microtech International, 203/468-6223; $6289. ✣ Vista 3.5GB; Relax Technology, 510/471-6112; $3499.
SCSI-2 adapter: QuickSCSI; PLI, 510/657-2211; $499.

MIDRANGE HARD DRIVES, Mar 93
Low-capacity drive: La Cie Cirrus 240; La Cie, 503/520-9000; $769.
Notable technology: DiamondDrive 510; Mass Microsystems, 408/522-1200; $2089.
Bargain: APS Fujitsu 520; APS Technologies, 816/478-8300; $1149.
All-around quality: hammer 525FMF; FWB, 415/474-8055; $2799.

MACINTOSH UPGRADES, Jun 93
Classic accelerator (40MHz): TransWarp Classic; Applied Engineering, 214/241-6060; $798 (with FPU).
SE accelerator (50MHz): Gemini Integra; Total Systems, 503/345-7395; $1089 (with FPU).
SE accelerator (25MHz): Quik30; Novy Systems, 904/427-2358; $449 (without FPU)
SE/30 accelerator (50MHz or 33MHz): Universal PowerCache; DayStar Digital, 404/967-2077; 50MHz $999 (with FPU), 33MHz $449 (without FPU).
LC and LC II upgrades: Macintosh LC III Logic Board

continues

MACWORLD Editors' Choice

Upgrade; Apple Computer, 408/996-1010; $599.
Mac II accelerators: ✣ Radius Rocket 25i, Radius Rocket 33; Radius, 408/434-1010; 25i $1199, 33 $2499. ✣ DayStar Digital Universal PowerCache series; DayStar Digital, 404/967-2077; $449 to $999.
IIfx SCSI accelerator: QuickSCSI; PLI, 510/657-2211; $502.
Quadra static-RAM cache card: FastCache Quadra; DayStar Digital, 404/967-2077; $299 for Quadra 700 and 900, $449 for Quadra 800 and 950.

OPTICAL DRIVES, Nov 92
3½-inch (128MB): ✣ Magic 128 REM/MO; MacProducts USA, 512/476-5295; $1199. ✣ NuDesign; MacDirect, 612/832-5706; $1298.
5¼-inch (650MB): PMO-650; Pinnacle, 714/727-3300; $4198.

REMOVABLE DRIVES, Nov 92
SyQuest drives: SyQuest drives are the best choice among removable drives for most users, but individual products are too similar for us to single out a specific vendor.

TAPE DRIVES, Dec 92
Personal Backup (up to 150 MB): APS Teac 155; APS Technologies, 816/478-8300; $499.
Midrange backup (150MB to 600MB): ✣ hammerTape 525; FWB, 415/474-8055; $1469. ✣ Vista 600 Tape; Relax Technology, 510/471-6112; $779.
High-capacity backup (1GB and beyond): APS Compression DAT; APS Technologies, 816/478-8300; $1699.

VIDEO/DISPLAY

24-BIT COLOR GRAPHICS BOARD, Feb 93
✣ Spectrum/24 PDQ Plus; SuperMac Technology, 408/541-6100; $1999.
✣ Thunder/24; SuperMac Technology, 408/245-2202; $2999.

COLOR LCD PROJECTION, Jan 93
Display panel: MediaPro; nView Corp., 804/873-1354; $7995.
Low-end panel: TFT Rainbow HD Model 700; Chisolm, 408/559-1111; $5295.
Complete LCD projector: System 6000; In Focus Systems, 503/692-4968; $8495.

FILM RECODERS, Aug 92
High-end: LFR Mark II; Lasergraphics, 714/753-8282; $14,995, RISC Rascol $5995.
Midrange: PCR II; Agfa Corp., 914/365-0190; $13,500.
Low-end: FilmPrinter Turbo II; Mirus Industries Corp., 408/944-9770; $7995.

VIDEO-CAPTURE BOARD, Jan 93
VideoSpigot; SuperMac Technology, 408/541-6100; $449 to $1399, depending on bundling options.

Vendors: Please write to *Macworld Editors' Choice*, 501 Second St , San Francisco, CA 94107, or send a fax to 415/442-0766 to inform us of changes in your phone number or your product's list price.

Software

ACCOUNTING/FINANCE

NETWORK/MULTIUSER ACCOUNTING, Nov 92
✣ Flexware II; Flexware, 916/581-6999; $695 to $895 per module.
✣ Great Plains Accounting; Great Plains Software, 701/281-0550; $795 per module.

PERSONAL FINANCE, Jun 93
✣ CheckWriter 4.0; Aatrix Software, 701/746-6801; $79.
✣ Andrew Tobias' Managing Your Money 5.0; MECA Software, 203/256-5000; $79.95.

SINGLE-USER ACCOUNTING (WITH PAYROLL), Nov 92
✣ Accountant Inc.; Softsync, 305/567-9990; $595.
✣ Checkmark MultiLedger and Payroll; CheckMark Software, 303/484-3541; $395.

SINGLE-USER ACCOUNTING (WITHOUT PAYROLL), Nov 92
M.Y.O.B.; Teleware, 201/586-2200; $249.

COMMUNICATIONS/NETWORKS

NETWARE CONNECTIVITY, Sep 93
NetWare for Macintosh; Novell, 801/429-7000; $495 for 5-user license to $2295 for 200-user license.

NETWORK MANAGEMENT, Feb 93
Network SuperVisor; CSG Technologies, 412/471-7170; $495.

NETWORK DIAGNOSTICS, Feb 93
Ethernet: EtherPeek; AG Group, 510/937-7900; $795.
LocalTalk: LocalPeek; AG Group, 510/937-7900; $495.

SOFTWARE ROUTER, Jul 93
Apple Internet Router 3.0; Apple Computer, 408/996-1010; Basic Connectivity Package $499.

GRAPHICS

2-D CAD, Jan 93
Low-end: BluePrint; Graphsoft, 410/461-9488; $295.
Midrange: PowerDraw; Engineered Software, 919/299-4843; $795.

3-D DESIGN, Aug 93
Price for performance: ✣ Ray Dream Designer 2.0.4; Ray Dream, 415/960-0765; $299. ✣ Alias Sketch 1.5; Alias Research, 416/362-9181; $995.
All-in-one solution: ✣ Infini-D 2.5; Specular International, 413/549-7600; $995. ✣ StrataVision 3D 2.6.1; Strata, 801/628-5218; $995.

DRAWING PROGRAMS (LOW-COST), Sep 93
Budget draw: Expert Draw; Expert Software, 305/567-9990; $49.95.
Budget draw/paint: UltraPaint; Deneba Software, 305/596-5644; $79.
Beginners' program: Aldus SuperPaint; Aldus Corp., 619/695-6956; $149.95.
Overall: Canvas; Deneba Software, 305/596-5644; $399.

PAINT AND IMAGE-EDITING, Sep 93
Budget buy: Expert Color Paint; Expert Software, 305/567-9990; $49.95.
Overall program: Fractal Design Painter; Fractal Design Corp., 408/688-8800; $399.
Image-editing program: Adobe Photoshop 2.5.1; Adobe Systems, 415/961-4400; $895.

ORGANIZATION/PRODUCTIVITY

CALENDARS, Jul 93
Alarm system: ✣ First Things First; Visionary Software, 503/246-6200; $79.95. ✣ Smart Alarms Plus; JAM Software, 203/630-0055; $125.
All-around scheduler: Now Up-to-Date; Now Software, 503/274-2800; $99.
Meeting scheduler: Meeting Maker; On Technology, 617/876-0900; five-pack $495.

PERSONAL INFORMATION MANAGEMENT, Feb 93
TouchBase/DateBook; After Hours Software, 818/780-2220; $169.95.

PRESENTATION TOOLS

MULTIMEDIA AUTHORING, Mar 93
Entry-level: ✣ Action; Macromedia, 415/252-2000; $495.
✣ Passport Producer; Passport Designs, 415/726-0280; $495.

UTILITIES

PRINTING, Sep 93
PC-printer cable packages: PowerPrint; GDT Softworks, 604/291-9121; $149.

SECURITY, Feb 93
File encryption and erasure: Citadel with Shredder; Datawatch Corp., 919/490-1277; $149.95.
Full-featured security: ultraSecure; usrEZ Software, 714/756-5140; $239.
Low-cost security: PassProof; Kensington Microware, 415/572-2700; $64.95.

WRITING TOOLS

WORD PROCESSORS, Sep 92
Beginning: WriteNow 3.0; WordStar International, 415/382-8000; $249.
Advanced: Microsoft Word 5.0; Microsoft Corp., 206/882-8080; $495.
Beyond: WordPerfect for the Macintosh 2.1; WordPerfect Corp., 801/225-5000; $495. m

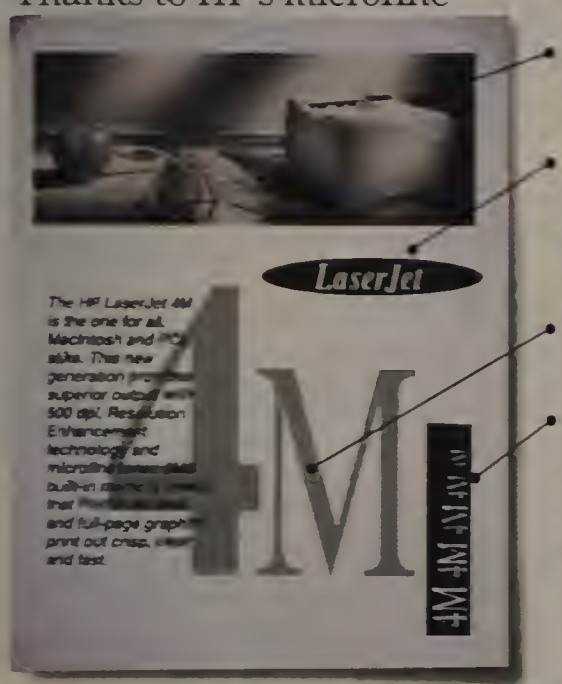
Looks like Mac users just got their very own HP LaserJet.

The new generation HP LaserJet 4M printer.

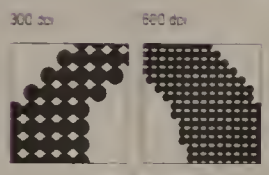
At last. An HP laser printer built specifically for the Mac—the new LaserJet 4M. A laser printer with everything Mac users need. From built-in PostScript™ Level 2 software from Adobe™ to standard LocalTalk and optional EtherTalk.

The finest print quality in its class.
Thanks to HP's microfine toner, Resolution Enhancement technology, and advanced engine designed expressly for 600 x 600 dpi, the LaserJet 4M printer delivers the finest print quality of any 600 dpi machine available.

And with a new RISC processor and 6 MB of standard memory accelerating formatting and I/O speeds, complex PostScript and graphics files are rendered faster and more clearly than ever before.



Greater flexibility.
The HP LaserJet 4M printer also sets new standards in versatility, with a wide range of typefaces and two integrated paper trays. As well as the options of a 500-sheet tray and power envelope feeder.



Four times the dots for better resolution.

And it's designed to be shared simultaneously by PCs and Macs. Automatic language switching between PCL 5 and PostScript, and 3 hot I/Os give mixed environments greater flexibility. Without compromise to either.

Of course, with the HP LaserJet 4M printer, you'll enjoy HP's renowned quality and reliability. All for only $2,399.* So call **1-800-LASER-JET (1-800-527-3753) Ext. 7340**** for print sample† and comparison disk. Or visit your nearest authorized HP dealer.

HEWLETT PACKARD

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MACWORLD
POSITIO

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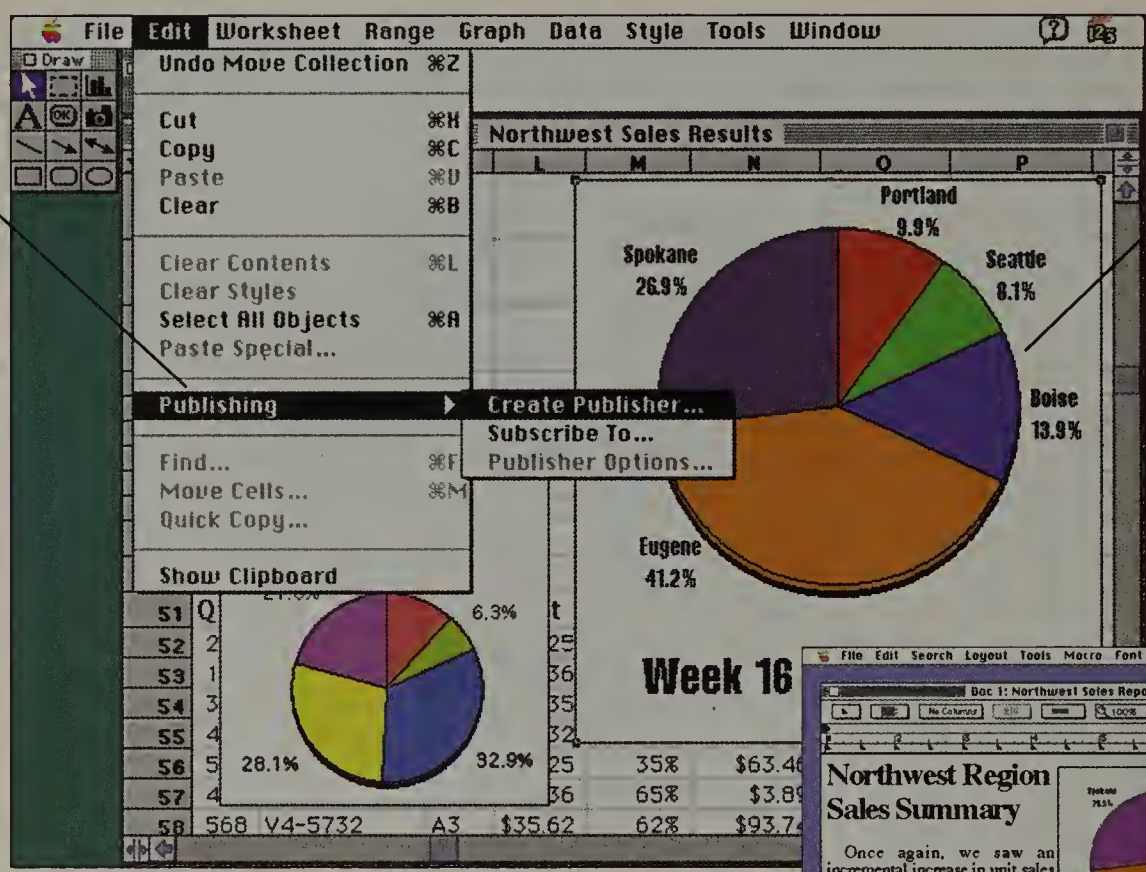
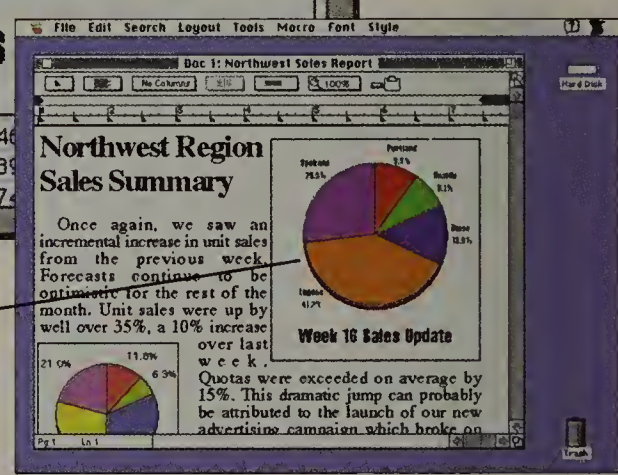
How to make sure your pies are always fresh.

System 7 lets you create "live links" between documents from different applications with a tool called Publish and Subscribe. By "Publishing" a chart from one document, you can "Subscribe To" it and place it in any number of other documents. When you update the original, all the other charts linked to it are updated automatically.



Select the item you want to publish—in this case, a pie chart in your spreadsheet. Go to the Edit menu and choose "Create Publisher." That's all there is to it. Now your chart is ready for you and others to subscribe to.



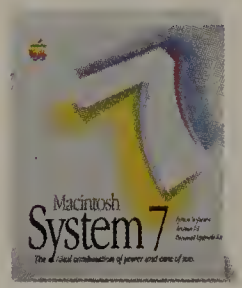
From your word processing document, select "Subscribe To" in the Edit menu, and you've placed a copy of the chart in your sales summary. When you make changes to the original chart, this new one will be updated automatically to reflect the changes.

Up-to-date documents with System 7.

With System 7™ software and a built-in tool called Publish and Subscribe, keeping reports and documents up to date is as easy as, well, you know what.

For instance, let's say you're working on a sales report in Microsoft Word. Let's also say that you've created a pie chart in a Lotus 1-2-3 spreadsheet showing your company's most recent sales results, and you want to include this chart in your final report.

Experience tells you, however, that these sales figures will continue to change right up to the very last minute.



No problem. With the Publish and Subscribe feature, you can publish the pie chart from your spreadsheet and then subscribe to it from within your word processing document.

This creates a "live link" between the two. Now, each time you revise the sales figures in your Lotus spreadsheet, the pie chart will automatically reflect the changes. So your final report will always be revised and up to date.

Of course, this is just one of the many ways System 7 can help make you more productive.

It's also just one of the many reasons why 5 million Macintosh® users are now working with System 7, as well as with the more than 6,000 applications available that run on it.

For the name of the Apple® software reseller nearest you, call 1-800-732-3131, ext. 500. Or, if you're a current System 7 user, get the System 7.1 Update Kit by calling 1-800-769-APPL, ext. 250.

And then see how System 7 can give you the power to keep all your ideas fresh. The power to be your best®.

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MACWORLD

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Edited by Wendy Sharp

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★★★★★ |- - - - - - - - - - - - - - - - - - - -| ★
Best Worst

Software

ACCOUNTING/FINANCE

★★ **Andrew Tobias' TaxCut for Macintosh, MECA Software, 203/256-5000, $79.95.** The occasionally awkward interface of this personal tax-preparation software doesn't follow every Mac standard, but the help system is very good. State versions are available for California and New York. May 93

★★★★ **BestBooks 1.0, Teleware, 201/586-2200, $99.** In a straightforward, unintimidating manner, this small-business accounting program integrates the standard bookkeeping functions of accounts receivable, accounts payable, and general ledger. There's little to criticize, except the weak documentation. Jul 93

★★ **Business Sense 1.6, Software Developers Consortium, 801/288-2216, $199.** Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. Feb 93

★★★★ **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. Sep 92

◤ **Great Plains Accounting 6.0 (6.1), Great Plains Software, 701/281-0550, $795.** High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★★ **MacInTax 1992, ChipSoft, 619/453-8722, $79.95.** It's difficult to correct your errors when using this personal tax-preparation software, but it's definitely easier than doing your taxes by hand. The display is attractive, the program supports electronic filing, and there are 15 state-tax versions available. May 93

★★★★ **Managing Your Money 5.0, MECA Software, 203/256-5000, $79.95.** An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. Jan 93

◤ **MYOB 3.0, Teleware, 201/586-2200, $149.** A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user who has no need for payroll capabilities, it's the best choice.

◤ **Quicken 3.0, Intuit, 415/852-9696, $69.95.** Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1, Timeslips Corp., 508/768-6100, $299.95.** Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. Sep 92

★★★ **WealthBuilder 2.0, Reality Technologies, 800/346-2024, $79.99.** Financial-planning software forces you to think about your money and helps you develop an investment plan. It's a good program for beginning investors, but more-sophisticated investors will want more-advanced features. May 93

BUSINESS TOOLS

★★★ **4D Server 1.0.1, ACI US, 408/252-4444, $1495 to $3495.** Database server uses the ingenious multitasking technology built into 4D to make it appear that each client has the full resources of the server. If you use 4D on a network, you need this product. Jun 93

★★★★ **4th Dimension 3.0.1, ACI US, 408/252-4444, $895.** Multitasking, which greatly improves speed in a carefully designed application, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. Apr 93

★★ **AccuZip6 1.5.2, Software Publishers, 714/846-1908, $899.** Professional-level mail-list management tool on CD-ROM is the most comprehensive system available, but its messy documentation and inexcusable user-interface violations make our reviewer reluctant to recommend it. May 93

★★★★ **Atlas Pro 1.0.6 (2.0), Strategic Mapping, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price. Nov 92

★★★ **Bar Code Pro 1.0 (1.3), Synex, 718/499-6293, $450.** Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

★★★★ **ClarisWorks 2.0, Claris Corp., 408/727-8227, $299.** Integrated program sets the standard. It provides more features, is easier to use and faster, and has better integration among modules than other available programs. Aug 93

★★★★ **Fair Witness 1.1 (1.2.1), Chena Software, 215/770-1210, $295.** A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. Oct 92

★★★★ **FileMaker Pro 2.0, Claris Corp., 408/727-8227, $399.** Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. Jan 93

★★★ **FlowChart Express 1.0 (1.01), Kaetron Software Corp., 713/890-3434, $149.** Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will need a larger, more powerful feature set. Jan 93

★★★★ **GeoQuery 3.02, GeoQuery Corp., 708/357-0535, $395.** Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create "pushpin" maps of files from your spreadsheet or database. Nov 92

★★★ **Helix Express 1.0, Helix Technologies, 708/205-1669, $439.** One of the most distinctive database products ever developed, this relational database has an iconic programming language that sometimes baffles traditional database programmers, but provides an easy route into basic data-handling chores for nonprogrammers. Helix Express is still the ultimate in multiuser simplicity for relational databases. Jul 93

★★★ **ithink 2.2.1, High Performance Systems, 603/643-9636, $695.** Although it requires a real training commitment for effective use, this product is an attractive dynamic business modeling system. It's a good bet for identifying cloudy spots in the crystal ball. May 93

★★★ **MacBarcoda 2.24, ComputaLabel, 508/462-0993, $895.** Compact, simple-to-use desk accessory creates bar codes in either EPS or Adobe Illustrator 1.1 format. DA cannot automatically create serial codes. Jun 93

★★★ **MacProject Pro, Claris Corp., 408/727-**

continues

MACWORLD Star Ratings

8227, $599. If you're working on a midsize project and like using PERT charts (where tasks appear in boxes and are connected by straight lines), this may be the project-management software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. May 93

★★ **Memorizer 2.0, Brains Software Engineering, 43-1-865-35-44 (Austria), $100.** Software records dictation from a Mac microphone and you transcribe the dictation in a word processor. You may prefer to stick with a hand-held tape recorder considering the product's RAM and storage appetite, and its propensity to crash. Aug 93

★★★★ **Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, $495.** Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and needs 2MB of RAM for practical use, but almost all users will want to upgrade. Oct 92

★★★★ **Microsoft Project 3.0, Microsoft, 206/882-8080, $695.** An amazing range of functions, including new scheduling and formatting, are packed into this project-management software. The improved tool bar helps novices schedule tasks with push-button ease. Jan 93

★★★ **Microsoft Works 3.0, Microsoft, 206/882-8088, $249.** Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatibilities, odd design choices, and performance flaws. Feb 93

★★★★ **nuBase Pro 1.5 (1.7), Tactic Software Corp., 407/832-1400, $395.** Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. Sep 92

★★ **Office Wiz 1.1 (1.1.4), Oryx Associates, 415/563-9971, $595.** 4D-based program attempts to integrate calendar, project, and contact management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. Nov 92

★★★ **Omnis 7 1.1, Blyth Software, 415/312-7100, $1250.** The plain, businesslike functionality of this database-development system produces solid applications without much fuss. Dec 92

★★★ **OrgChart Express 1.0, Kaetron Software, 713/890-3434, $279.** Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worth it for people who regularly work with large or complex organization charts. Apr 93

★★★★ **Panorama 2.0 (2.1), ProVue Development Corp., 714/892-8199, $395.** Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. May 92

★★★ **Perspective 1.5, U.S. Data on Demand, 800/352-7352, $129.95.** The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. Sep 92

★★★★ **Project Scheduler 5, Scitor Corp., 415/570-7700, $695.** For most midrange project-planning, this program's many hits outweigh its few misses. It goes beyond the requisite scheduling options, with inflation factors and unlimited projects in memory, and it conforms to accepted standards, so you get consistent, predictable results. Aug 93

★★★ **@Risk 1.1, Palisade Corp., 607/277-8000, $395.** Statistical simulator for Microsoft Excel financial computations generates complex, statistically valid templates within Excel and is the first choice for analysts who work with probabilistic models every day. It assumes that the user is an Excel power user. Aug 93

★★★ **SpreadBase 1.0.1, Objective Software, 415/306-7410, $695.** Powerful business data-analysis tool is a unique combination of database and spreadsheet functions. It's worth a close look for power users, despite meager documentation and a cranky macro language. May 93

★★★ **Wingz 1.1ae, Informix Software, 913/599-7100, $399.** If you want a low-overhead spreadsheet with advanced-math functionality, this is an attractive product. What you get is a competent calculating engine with superior charts; what you miss is outlining, real 3-D spreadsheet linking, and the host of third-party add-ons offered for Microsoft Excel. Jul 93

★★★ **WordPerfect Works 1.2, WordPerfect Corp., 801/225-5000, $249.** A very good word processor, a spreadsheet, a database, charting, drawing, painting, and communications make up the seven well-integrated and flexible modules of this program. It has a few shortcomings, including some memory-management problems, but buyers should generally be pleased. Jun 93

COMMUNICATIONS/NETWORKS

★★★ **A/UX 3.0, Apple Computer, 408/996-1010, $795.** Hybrid–operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. Nov 92

★★★★ **AccessPC 2.0, Insignia Solutions, 415/694-7600, $99.95.** Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. Oct 92

★★★ **CompuServe Information Manager 2.0.1, CompuServe, 614/457-8600, $49.95.** The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. Dec 92

★★★ **Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, $79.** For basic file-transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. Oct 92

★★★★ **MicroPhone Pro, Software Ventures Corp., 510/644-3232, $295.** Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. Apr 93

★★ **NetVirtual 2.0, Eclectec, 408/462-2040, $995 to $4985.** One-of-a-kind network-simulation product favors flexibility at the expense of usability. Only after hours of work will your simulation report anything meaningful about your network, and even then the results are difficult to analyze. Apr 93

◤ **NetWare for the Macintosh 3.011 (4.0), Novell, 800/638-9273, $495-1995.** NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage. This set of NetWare Loadable Modules lets you add Macs to a NetWare network.

★★★ **Network Vital Signs 1.0 (1.1), Dayna Communications, 801/531-0600, $449.** Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors. Unfortunately, when monitoring more than ten devices, it noticeably degrades the performance of the monitoring Mac. Mar 93

★★★ **On the Air 1.0.1, Digital Eclipse Software, 510/547-6101, $79.99 to $639.99.** Intercom system transmits System 7 SND resources, SoundEdit, and AIFF sound files across a network. It's well designed and performs decently, but its usefulness seems limited. Aug 93

★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, $895.** Keep your finger on the pulse of router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. Oct 92

★★ **SoftPC with Windows, Insignia Solutions, 415/694-7600, $499.** The emulation of a complete and accurate Windows environment on a Mac is an amazing accomplishment, but the product is so slow, even on a Quadra, that it performs in what might best be characterized as a dreamlike languor. Jun 93

★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, $129.** Collection of five applications provides essential network-monitoring tools at a price that would please anyone. Dec 92

★★★★ **Timbuktu 5.0.1, Farallon Computing, 510/814-5000, $199 to $5500.** By letting one computer (a Mac or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Despite minor blemishes, it's a clear winner. Mar 93

◤ **WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, $139.** In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

DESKTOP PUBLISHING

★★★★ **Aldus Fetch 1.0, Aldus Corp., 206/622-5500, $295.** The rich feature set and network support of this image-cataloging software make it a clear winner. Although cataloging is slow, users have fine control of the depth and compression of thumbnails. Aug 93

★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, $795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. May 92

★★ **Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, $199.** Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners. Mar 93

★★★ **Apple Font Pack, Apple Computer, 408/**

996-1010, $99. Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's not a bad deal, considering that Adobe PostScript fonts cost four times as much. Mar 93

★★★ **Cumulus 1.1, Canto Software, 415/431-6871, $295.** Good network support, plus a feature that creates a protocol file for recording user actions, make this image-cataloging program a good choice for workgroups. It doesn't have an image preview feature, or offer 32-bit thumbnails. Aug 93

★★★ **Expanded Book Toolkit 1.0.1, The Voyager Company, 310/451-1383, $295.** Using this hypermedia publishing program, average mortals can create highly functional multimedia books in a fraction of the time it would take to do the job unassisted. Be aware, though, that it's no QuarkXPress. Jun 93

★★★★ **Fontographer 3.5 (3.5.1), Altsys Corp., 214/680-2060, $495.** Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. Nov 92

★★ **ImageAccess 1.0, Nikon, 516/547-4355, $495.** This expensive image-cataloging program has an unusual interface and cannot be used over a network. A plug-in module provides direct support for Nikon's LS-3510AF film scanner. Aug 93

★★ **Kudo Image Browser 1.0, Imspace Systems Corp., 619/272-2600, $295.** This image-cataloging software cannot control thumbnail depth or compression, and doesn't have a keyword feature or allow multiple users to access the catalog simultaneously. The unique Riffle feature lets you quickly scan images. Aug 93

★★★ **Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, $199.99 to $499.99.** Type 1 font made from your handwriting has clean, even lines—whether or not your writing does. Apr 93

★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, $249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects, such as gradient fills. Oct 92

★★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, $185.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. Jul 92

★★★ **Personal Font, Signature Software, 503/386-3221, $179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. Dec 92

★★★ **Publish It Easy 3.0, Timeworks, 708/559-1300, $199.95.** Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★★★ **QuarkXPress 3.1 (3.11), Quark, 800/788-7835, $895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. Jul 92

★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, $695.** A strange mixture of power and oversight, this page-design and -layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. Dec 92

★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, $59.** Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. Jan 93

★★★★ **SuperATM, Adobe Systems, 415/961-4400, $149.** This upgrade to Adobe Type Manager lets you view Adobe-brand PostScript fonts on screen and output them at high resolutions, even when the corresponding printer fonts are unavailable. Although it has limitations, this is an outstanding advance in font technology and a tremendous value. May 93

EDUCATION

★★★★ **Algebra, Broderbund Software, 415/382-4400, $89.95 to $99.95.** Interactive, imaginative math tutorial is keyed to the standard textbook order of topics, but offers much more. It is particularly strong on word problems and graphing. May 93

★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, $49.95.** Use logic and raw brainpower to navigate a series of rooms, mazes, and hallways. Puzzles range from simple and mundane to creatively laborious. Dec 92

★★ **Comprehensive Review in Biology, Queue, 203/335-0908, $295.** There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what this CD-ROM is. May 93

★★★ **Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, $795.** The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD-ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★★★ **Decimal & Fraction Maze 1.2, Great Wave Software, 408/438-1990, $69.95 to $89.95.** Education software weaves the threads of eight math curricula—from third grade to eighth, along with two levels of adult education—into an interesting and visually stimulating game. Jul 93

★★ **Dvorak on Typing 1.0, MacPlay, 714/553-3530, $49.95.** Typing tutor offers solid lessons, but the small annoyances, such as never being able to take intermediate or advanced lessons without first passing a test, add up. Jun 93

★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, $59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, $59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

★★★ **MacGlobe 1.3.0, Broderbund Software, 415/382-4400, $44.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement, it provides a fascinating intellectual adventure. Feb 93

★★★★ **Mavis Beacon Teaches Typing 2.0, The Software Toolworks, 415/883-3000, $49.95.** If being entertained while learning to type interests you, this typing tutor provides varied environments, interesting lessons, and good games. Jun 93

★★★ **Millie's Math House, Edmark Corp., 206/556-8400, $49.95.** Early math-education software provides a variety of ways for preschoolers to experiment with numbers and counting. It's entertaining and engaging, but more advanced levels and more flexibility would keep children challenged longer. Jul 93

★★★★ **The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, $395.** The remarkably current and scholarly text of this encyclopedia on CD-ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, $349.** Although this Japanese language CD-ROM offers solid instruction, it's so expensive and so limited in its word selection that it's not an economical choice for individual users. Jan 93

★★ **The Secret Codes of C.Y.P.H.E.R. 1.0 (1.1), Tanager Software Productions, 510/430-0900, $59.95.** Intriguing facts about mammals and a variety of alphabets provide the interest in this educational game, but the inescapable, repetitive animations are a major detraction. Apr 93

★★★ **The Secret Island of Dr. Quandary 1.0 (1.01), MECC, 612/569-1500, $49.95 to $69.95.** Clever package of gorgeous landscapes, catchy sounds, and tempting arcade-game puzzles uses math, logic, and reading skills. Although somewhat slow, it's fun for parents and kids. Jun 93

★★★ **Stickybear's Reading Room 2.2a, Optimum Resource, 803/785-7441, $59.95.** Educational game with four different activities takes a sedate but direct path to building primary-level reading skills. It's appropriate for ages four to eight, but probably too juvenile for older kids. Jun 93

★★★ **Time Treks 1.0, Earthquest, 415/321-5838, $59.95.** An eccentric archaeologist opens portals through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. Sep 92

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, $139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. Oct 92

★★★★ **Where in America's Past Is Carmen Sandiego? 1.0 (1.3), Broderbund Software, 415/382-4400, $44.95.** Travel in time and the U.S. chasing those V.I.L.E. crooks in this clever educational history/geography game that's challenging for all ages. Mar 93

★★★★ **Where in the World Is Carmen Sandiego? Deluxe Edition, Broderbund Software,**

continues

MACWORLD Star Ratings

415/382-4400, $59.95. The V.I.L.E. gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

ENTERTAINMENT

★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, $49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection and the inability to save games in progress make it less enticing. Sep 92

★★★★ **A-Train, Maxis, 510/254-9700, $69.95.** Charming railroad simulation offers astonishing, and often witty detail, but the learning curve is high and the interface isn't completely Mac-like. Apr 93

★★ **America Alive, MediaAlive/CD Technology, 408/752-8500, $99.** QuickTime movies, photographs, maps, text, and audio mingle in this multimedia CD-ROM guide to the U.S. It's a promising concept, but it doesn't yield much useful information. Mar 93

★★★★★ **Arthur's Teacher Trouble, Broderbund Software, 415/382-4400, $59.95.** Every page of this delightful animated book is dense with surprises that arouse and satisfy a child's curiosity. In the words of six-year-old Alex, "It's like chocolate ice cream. You can have it more than once and it's still good." Apr 93

★★★ **Audioshop 1.0 (1.05), Opcode Systems, 415/856-3333, $69.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD-ROM player. A number of quirks may confuse new users. Sep 92

★★★ **Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, $79.95.** Elaborately detailed cartoon characters act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. Mar 93

★★★ **The Battle of Britain, Deadly Games, 215/295-2284, $39.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. Dec 92

★★★ **Blade 1.1 (2.0), Leviathan Corp., 313/826-3560, $99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. Sep 92

★★★ **Capitalist Pig 1.0 (1.02), Pluma Software, 602/969-9441, $59.95.** Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business-simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. Sep 92

★★★ **Cogito 1.0, Inline Design, 203/435-4995, $59.95.** Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. It gets more and more complex as you progress through the 120 levels. Apr 93

★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, $49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. Sep 92

★★★★ **Go Master 5, Toyogo, 802/464-5526, $69.** Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. Dec 92

★★★★ **Hellcats Over the Pacific 1.0.3, Graphic Simulations, 214/699-7400, $69.95.** Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. Apr 93

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, $39.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. Feb 93

★★★★ **Jewelbox 1.5, Varcon Systems, 619/563-6700, $49.95.** This gem of a game is strongly reminiscent of Tetris. The jewels fall into rows that disappear when you place three jewels of a kind together. Jun 93

★★★ **Kid Pix Companion, Brøderbund Software, 415/382-4400, $29.95.** Addition to Kid Pix adds clever new features, including the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. Oct 92

★★★★ **Maelstrom 1.03, Ambrosia, P.O. Box 23140, Rochester, NY 14692-3140, $15 plus $5 shipping and handling.** Fast-paced arcade game is loosely modeled after Asteroids, the Atari classic. Maelstrom features superb animation, hilarious sound effects, exciting action—and best of all, it's shareware. Jun 93

★★★★ **Monkey Island 2: LeChuck's Revenge, LucasArts Games, 415/721-3394, $59.95.** This whimsical Twilight Zone of life on the high seas is the adventure-game equivalent of *Mad* magazine, filled with witheringly sarcastic dialogue, splendid gross-out jokes, heapings of self-parody, and enough hilarious detail to keep you amused for days. May 93

★★★ **Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, $59.95.** This CD-ROM includes an unusual essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped minilecture on Mozart's life, but sadly enough the music is limited almost entirely to the title piece. Apr 93

★★ **The Orchestra: The Instruments Revealed, Time Warner Interactive Group, 818/955-9999, $79.98.** The many-branched, interwoven hypertext style of this music-education CD-ROM makes it hard to navigate and digest, despite its richness. For the price, other music-education CD-ROMs present better values. Apr 93

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, $29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD-ROM that combines the excitement of the stage with the reflective appeal of the page. Feb 93

★★★★ **Prince of Persia, Broderbund Software, 415/382-4400, $49.95.** A high tolerance for frustration is necessary to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it worthwhile. Sep 92

★★★ **Red Baron 1.0, Dynamix, 800/326-6654, $69.95.** The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. Nov 92

★★★★ **Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, $59.95.** *Don Juan, Till Eulenspiegel,* and *Death and Transfiguration* are the three works included in this CD-ROM, with a program written by Russell Steinberg. The musical analysis is satisfying, and the lush orchestral music will appeal to both novice and experienced classical music listeners. Apr 93

★★★ **Rodney's Wonder Window, The Voyager Company, 310/461-1383, $39.95.** Collection of 23 colorful, wacky graphics and animations by Rodney Alan Greenblat is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. Mar 93

★★★ **Schubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, $59.95.** Alan Rich, classical music commentator for National Public Radio, conveys his enthusiasm for this appealing music in this CD-ROM's lively text. However, the discussion is relatively unchallenging and the musical performance, though well regarded, is not at the top of most reviewers' lists. Apr 93

★★★★ **The Secret of Monkey Island 1.0, LucasArts Games, 415/721-3300, $59.95.** A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and irksome copy protection only slightly spoil the delight. Sep 92

★★★ **Sherlock Holmes, Consulting Detective, Volume II, Icom Simulations, 708/520-4440, $69.95.** Match wits with the legendary detective by solving three difficult mysteries in this CD-ROM game. May 93

★★★ **SimLife, Maxis, 510/254-9700, $69.95.** A megalomaniac's dream come true, this amazingly intricate simulation game lets players create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, $24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD-ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. Feb 93

★★★ **Space Quest 1: Roger Wilco in the Sarien Encounter, Sierra Online, 209/683-8989, $19.95.** As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. Puzzles range from the obvious to the head-scratching, but for most players the game will be easy to complete. Apr 93

★★★ **Super Mines 1.0, Callisto Corp., 508/655-0707, $49.95.** You use logic to search a minefield without setting off mines in this fast-paced game that's easy to learn, but offers 84 levels for long playability. Apr 93

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95.** Teensy tiles are a minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/**

560-0973, $59.95. Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

★★★ **Warlords, Strategic Studies Group, 904/494-9373, $49.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. Dec 92

★★★★ **Who Killed Sam Rupert, Creative Multimedia Corp., 503/241-4351, $39.99.** You're a police detective trying to solve the murder of a popular restaurateur in this interactive CD-ROM that exploits the full range of multimedia options and provides a wealth of clues and surprises to hold your interest. May 93

GRAPHICS

★★★ **addDepth 1.0.2, Ray Dream, 415/960-0768, $179.** The purpose of this graphics program is to enhance the creation of 2-D images with 3-D effects. It's versatile, accommodating, and affordable, but working on complex images gets tedious because of the automatic application of styles. Aug 93

★★★ **Adobe Dimensions, Adobe Systems, 415/961-4400, $199.** This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript. Apr 93

◪ **Adobe Illustrator 3.01 (3.23), Adobe Systems, 415/961-4400, $695.** Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

★★★★ **Adobe Photoshop 2.5, Adobe Systems, 415/961-4400, $895.** No graphics program is as universally loved and as downright deserving of user loyalty as this one, but while this upgrade builds on the program's wide range of capabilities, it ignores some minor weaknesses that have begun to peek through the product's armor. It's still great but perhaps not perfect. Jun 93

★★★ **Aldus FreeHand 3.1 (3.11), Aldus Corp., 206/628-2320, $595.** A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. Jun 92

★★★★ **Alias Sketch 1.5, Alias Research, 416/362-9181, $995.** The enhanced modeling and revamped rendering capabilities of this 3-D illustration program contribute to a tremendous and reliable upgrade, a heartening example of a company listening to its users and delivering on its promises. Jul 93

★★ **ArtBeat Professional 1.0, Pie Practical Solutions, 201/902-9500, $249.** Despite a smattering of unique capabilities, this inexpensive draw and paint program lacks many of the features of equivalent programs. Apr 93

★★★ **artWorks 1.0, Deneba Software, 305/596-5644, $149.** If you're expecting a graphics dynamo, this combination paint and draw program will leave you a little cold. But despite its flaws, it ranks as one of the best graphics programs available under $200. Jun 93

★★ **AutoCAD Release 11, Autodesk, 415/332-2344, $3500.** Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. Dec 92

★★★★ **Blueprint 4.0, Graphsoft, 410/461-9488, $295.** Entry-level 2-D drafting program is a wonderful antidote to the complicated CAD system blues. Don't be misled by the low price; this full-fledged drafting package is powerful enough to serve professionals who appreciate the value of simplicity. Jul 93

★★★ **Cachet 1.0 (1.2), Electronics for Imaging, 415/742-3400, $595.** The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. Dec 92

◪ **Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, $399.** Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision drawing functions in particular should appeal to many users.

★★★ **Color It 2.0.1, Timeworks, 708/559-1300, $299.95.** Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. Apr 93

★★ **CPM Graphic Tutor 1 & 2, Caseys' Page Mill, 303/220-1463, $489 per volume.** Although some neophytes may find these CD-ROM tutorials on Adobe Illustrator and Adobe Photoshop helpful, the programs' distracting interfaces, inconsistent execution, lack of polish, and high price weigh strongly against them. May 93

★★★ **DesignCAD 2D/3D 3.0.1 (4.0), DesignCAD, 918/825-4848, $499.95.** Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. Nov 92

★ **Easy Color Paint 3.0, MECC, 612/569-1500, $59.95.** For a program that purports simplicity, this color paint program is anything but. Possibly the weakest, least intuitive paint program for the Mac, it's unnecessarily complex and frustrating. Jul 93

★★★★ **ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495.** The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. Feb 93

★★★ **Expert Draw 1.0, Expert Software, 305/567-9990, $49.95.** Inexpensive draw program is not really for experts, but it offers a decent, no-frills set of basic drawing tools and commands for beginning illustrators, office use, or anyone on a budget. Aug 93

★★★★ **Folio 1 Media Kit, D'Pix, 614/299-7192, $299.95.** Each image in this texture collection on three CD-ROMs provides a dynamic range of colors, highlights, and shadows; is free of artifacts; and is crisply focused. The collection as a whole is well chosen, although the high-resolution images are hard to access. Aug 93

★★★★ **Fractal Design Painter 2.0, Fractal Design Corp., 408/688-8800, $399.** If you can put up with a few inconveniences and surprises, this color paint software provides the real meat-and-potatoes tools required by professional artists, and many of its functions—natural media brush tools, the color-sensitive magic wand, 2-D lighting effects—are entirely without peer. Jul 93

★★★ **Generic CADD 2.0, Autodesk, 206/487-2233, $495.** Competent, midlevel 2-D drafting program has a well-executed Mac interface, a good complement of tools, and a sprinkling of high-end features, such as floating-point precision. Aug 93

★★ **Image Assistant 1.0, Caere Corp., 408/395-7000, $495.** Besides unsatisfactorily addressing Adobe Photoshop's small list of liabilities, this image-editing software is barely able to keep up with less expensive bitmap editors. Problems include an unforgivable lack of antialiased text, no selective revert function, and an incorrectly implemented smudge tool. Apr 93

★★★★ **Infini-D 2.0 (2.5), Specular International, 413/549-7600, $995.** Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. Jan 93

★★★★ **IntelliDraw 1.0, Aldus Corp., 206/628-2320, $299.** Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. Nov 92

★★★★ **Kai's Power Tools Volume 1 1.0, HSC Software, 310/392-8441, $149.** Photoshop plug-ins include image-editing filters; texture, gradient, and fractal generators; and special-effects tools. Although at times monstrously complicated, this collection represents a virtually infinite supply of visual resources. It's an amazing tool that no regular Photoshop user should be without. May 93

◪ **MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695.** This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

★★★★ **MiniCAD+ 4, Graphsoft, 410/461-9488, $795.** Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features-champion status and is easier to use. Mar 93

★★★ **Ofoto 2.0, Light Source Computer Images, 415/461-8000, $395.** Many new features—notably color support—have been added to the already impressive toolbox of this scanning software. It often produces good results, but it rarely produces the best scan possible for a given image and output method. Jul 93

★★★★ **Paint It 1.0, Timeworks, 708/559-1300, $59.95.** Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

★★★★ **PosterWorks 3.0, S.H. Pierce & Co., 617/338-2222, $395.** Large-format graphics production tool is for people who think big, up to 10,000 square feet big. It fills the need for user-defined, full-color, large-format output robustly and elegantly. Aug 93

★★★★ **Ray Dream Designer 2.02 (2.06), Ray Dream, 415/960-0765, $299.** Experienced 3-D aficionados will find this 3-D–imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from 2-D to 3-D. Improved text-handling and viewing capabilities would make it even better. Sep 92

continues

MACWORLD

Star Ratings

★★★★ **Sketcher, Fractal Design, 408/688-8800, $149.** A variety of effects reproduce techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★★ **Smoothie 1.02, Peirce Software, 408/244-6554, $149.** Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. Nov 92

★★ **StrataType 3d 1.0 (2.0), Strata, 801/628-5218, $199.** The rulers, texture palette, custom bevels, and canned positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. Mar 93

◪ **Swivel 3D Professional 1.0 (2.0.4), Macromedia, 415/252-2000, $695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

★★★ **Tree, Onyx Computing, 617/876-3876, $295.** Single-purpose program generates lifelike color drawings of trees from a number of easily controlled parameters. Although visually appealing, it's an expensive way to draw a tree. May 93

★★★ **Typestry 1.0 (1.1), Pixar, 510/236-4000, $299.** Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. Nov 92

★★★ **Virtus WalkThrough 1.1.3, Virtus Corp., 919/467-9700, $495.** Interactive 3-D modeling tool provides instantaneous access to rendered 3-D scenes, allowing you to travel through models at will. While it has some problems (such as occasionally just quitting), it's an excellent value that may change both how you design and how you think about design. Jul 93

★★★ **Wraptures One, Wraptures Two, Form and Function, 619/536-9999, $95 each.** The images in these texture collections on CD-ROM are generally acceptable, although some are muddy and others are difficult to decipher at low resolutions. If you need images for repeating patterns, however, these repeat seamlessly and are a good value. Aug 93

MATH/SCIENCE

★★★ **Amazing Universe 2.1, Hopkins Technology, 612/931-9376, $79.95.** Space-image exploration package on CD-ROM offers an amazing variety of astronomical images with a very competent program (ProVision II) for modifying and inspecting those images. It assumes that users won't be fazed by such things as writing their own image-convolution matrices. Aug 93

★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, $130.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

★★★★ **CircuitMaker 3.0, MicroCode Engineering, 801/226-4470, $200.** Much of the tedium of diagramming circuits and constructing prototypes is relieved by this digital circuit simulator that provides a powerful set of basic tools for a very reasonable price. Aug 93

★★★★ **Data Desk 4.0 (4.1), Data Description, 607/257-1000, $595.** For finding patterns in data, this statistical-analysis program has no peer. Years of refinement have made it a unique, and uniquely valuable, tool for analysis, despite its lack of some tests found in larger programs. May 93

★★★ **Expert Astronomer 1.0 (1.1), Expert Software, 305/567-9990, $49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

★★★★ **Expressionist 3.0 (3.01), Prescience Corp., 415/543-2252, $199.95.** If you work regularly on similar topics, you can customize this equation-writing software to produce equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

★★★ **FASTAT 2.0, SYSTAT, 708/864-5670, $495.** Statistical business-analysis software makes sense as a day-to-day statistics tool for business or scientific users. It provides the right statistical tests for most requirements, and its graph types provide plenty of information, although they lack glamour. Jun 93

★★★★ **HiQ 1.0 (2.0), Bimillennium Corp., 408/354-7511, $995.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

★★★★ **MacBreadboard 1.1 (1.13), Yoeric Software, 919/644-1620, $59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

★★★★ **MacPhase 1.2, Otter Solutions, 315/768-3956, $159.** Low-cost, scientific-data-visualization software with a large assortment of mathematical tools is one of the few authentic bargains in science software. One of its principal strengths is a well-planned color lookup table editor that's delightfully easy to use. May 93

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, $493.95.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

★★★ **MathCAD 3.1, Math5oft, 617/577-1017, $495.** Numerical and symbolic computation software is easy to learn, easy to use, produces good reports, and is much more powerful than earlier versions. It still doesn't compete in scope with the largest math programs, but for most science and engineering tasks, it's a fast way to get problems solved. Jun 93

★★★★ **MathType 3.0, Design 5cience, 310/433-0685, $199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

★★★★ **5equencher 2.0 (2.0.8), Gene Codes Corp., 313/769-7249, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

★★★ **Simulink 1.2, The MathWorks, 508/653-1415, $3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★★ **Spyglass Dicer 2.0, Spyglass, 217/355-6000, $695.** Scientific 3-D visualization tool displays a two-dimensional slice through a three-dimensional object (which is represented in the computer by a data table). While Dicer pushes the limits of the Mac hardware, for its function this product is really the only game in town. Jul 93

★★★ **5tatView 4.0m, Abacus Concepts, 510/540-1949, $595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **Theorist 1.5, Prescience Corp., 415/543-2252, $449.95.** Symbolic-mathematics program that you can figure out by yourself adds a useful table feature, more special functions of physics, and better graphics. Plus, it's still the only program to use real notation directly. May 93

★★★★★ **Voyager II, Carina Software, 510/352-7328, $159.95.** If a brilliantly-lit, star-filled sky holds more than a moment's fascination for you, you need to know about this astronomy program. In a firmament of mostly faint and forgettable astronomy software, it's a supernova. Jul 93

ORGANIZATION/PRODUCTIVITY

★★★ **Achieving Your Career 1.02, Up Software, 415/921-4691, $69.** HyperCard-based job search software succeeds by compactly organizing. It provides a structure for identifying letters to write, phone calls to make, and interviews to follow up. Aug 93

★★ **ACT 1.0 (1.01), Contact 5oftware International, 214/919-9500, $395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

★★★★ **Agent DA 2.0 (2.1.3), TeamBuilding Technologies, 514/278-3010, $99.** Simple, flexible calendar/reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. Sep 92

★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, $69.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and

continues

Your Mac can say a lot about you.

If somebody sat down at your Mac and started snooping around your disk, which would embarrass you more?

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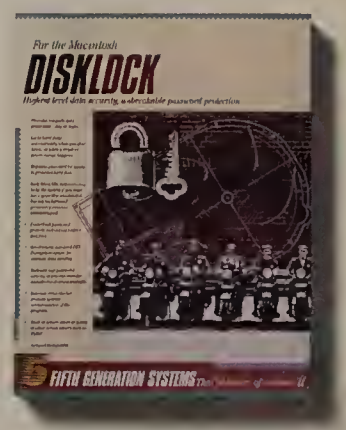

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We'll give you all the juicy details.

FIFTH GENERATION SYSTEMS, INC

Circle 135 on reader service card

MACWORLD **Star Ratings**

the programs must be running in order for alarms to sound. Sep 92

★★ **ClienTrac 1.7.1, Whiskey Hill Software, 415/851-8702, $135.** Easy-to-use, HyperCard-based contact-management software performs as billed, but fails to inspire much enthusiasm. Aug 93

★★ **Connections 2.1, Heizer Software, 510/943-7667, $199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

★★★ **ContactEase 2.0.1, WestWare, 619/660-0356, $395 to $1495.** Contact-management and sales-automation software helps salespeople keep in touch with contacts, makes it easy to generate letters, and maintains detailed records of activities. It has a few quirks but is overall a good program. Aug 93

★★★★ **DateBook 1.5.1 (1.5.li), After Hours Software, 818/780-2220, $125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

★★★★ **DayMaker 2.0 (2.03), Pastel Development Corp., 212/941-7500, $129.95.** If you need to organize lots of disparate information, follow up on meetings with many people, keep track of your own calendar, create an archive of completed work, and print out lists of to-do items to take on the road, this free-form personal information manager is a great choice. May 93

★★★ **Dynodex 3.0, Portfolio Software, 408/252-0420, $89.95.** The speed and printing options of this field-based address-book manager are its strengths, but this upgrade adds welcome improvements to the interface, including automatic formatting of phone numbers. Apr 93

★★★ **EasyAlarms 2.0.3 (2.1), Essential Software, 619/481-1477, $99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

★★ **Hello, Atelier Systems, 619/453-4300, $99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

★★★★ **In Control 2.0, Attain Corp., 617/776-1110, $129.95.** The best features of an outlining program are combined with those of a database, making it easy to sort, search, organize, and print your to-do list. Aug 93

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, $295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

★★★ **Intouch 2.0.4, Advanced Software, 408/733-0745, $99.95.** Free-form database is a fast and easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although this version adds a handy reminder system, it falls short as a calendar planner. Feb 93

★★★ **LapTrack For the Mac 1.0b, Timeslips Corp., 508/768-6100, $79.95.** Time- and expense-tracking program offers the right features for the on-the-go professional, but the interface is overcomplicated and the documentation is sloppy. Still, in spite of its flaws, it does an excellent job. May 93

★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, $34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

★★★★ **Now Up-to-Date 2.0, Now Software, 503/274-2800, $99 to $799.** Calendar utility combines flexibility, ease-of-use, and streamlined operations in an almost irresistible package. The Reminder control panel, while a great new feature, has had minor conflicts. Jun 93

★★★ **Office Manager 2.1 (2.5), White Crow Software, 800/424-0310, $99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its usefulness for low-end Macs. Dec 92

★★★★ **Spiral 1.0 (1.02), Technology Works, 512/794-8533, $129.** Designed specifically for taking and organizing notes, this product provides an excellent feature set, including bookmarks and an option for automatically expanding abbreviations, but it's marred by some errors in the editing and import/export processes. Mar 93

★★ **TimeVision 1.0, Powercore, 815/468-3737, $99.** New scheduler with notepad and card-file functions tacked on has some worthwhile features, but in general doesn't match up to the competition. May 93

PRESENTATION TOOLS

★★★★ **Action 1.0 (1.02), Macromedia, 415/252-2000, $495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

★★★★ **Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/961-4400, $695.** A dream command post for video professionals, this QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. Jan 93

◪ **Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, $495.** For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, $149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★ **Comet CG 1.0.3, MSI, 317/842-5097, $995.** Program for generating antialiased text over live video is reasonably priced compared with dedicated graphics systems, but you're likely to be as astonished by its limitations as you are impressed by its capabilities. It offers too few formatting options, a cumbersome interface, and an insubstantial manual. May 93

★★★ **DiVA VideoShop 1.0, DiVA Corp., 617/491-4147, $599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. Jul 92

★★★ **Hi Rez Audio Volume 1.0, Presto Studios, 619/689-4895, $149.95.** The enjoyable, high-quality music on this CD-ROM adds a nice touch to presentations. The software for browsing the music is quirky, and the product could use some documentation. Jul 93

★★★ **Interactive Training for Director 1.1, Media In Motion, 415/621-0707, $199.** This somewhat expensive program teaches basic Macromedia Director skills and provides a foundation for exploring Director's other features. It has a clear, often lighthearted approach, but navigating the lessons can be frustrating. Jun 93

★★★ **Macromedia Director 3.1 (3.1.1), Macromedia, 415/252-2000, $1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping $149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

★★★ **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, $195 to $495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic to genuinely funny. Apr 93

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, $495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

★★★ **Morph 1.0 (1.1), Gryphon Software Corp., 619/454-6836, $149.** With patience and practice, you can become a high-tech special-effects wizard using this image-melding movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

★★ **Motion Works ProMotion 1.0 (1.03), Motion Works, 604/685-9975, $395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. Nov 92

★★ **MovieWorks 1.1, Interactive Solutions, 415/377-0136, $395.** Over 100 bugs were fixed in version 1.1 of this multimedia authoring software that takes an all-in-one approach to creating presentations, but problems remain. For now, it's a good idea, poorly executed. Jun 93

★★★ **Passport Producer 1.0, Passport Designs, 415/726-0280, $495.** Strong timing controls and good sound capabilities mix with middling text- and image-handling and a lack of even basic animation options in this partially successful entry-level multimedia program. Apr 93

★★★ **Special Delivery 1.0 (1.1), Interactive Media Corp., 415/948-0745, $399.** This entry-level multimedia package has the tools to assemble interactive screen presentations that burst with motion and sound, but its interface is disorienting and it lacks the polish and power of other similarly priced programs. Mar 93

★★★ **VideoFusion 1.0.1, VideoFusion, 419/891-1090, $649.** Collection of special effects for

continues

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STATISTICA/Mac™ A complete statistical data analysis system with hundreds of presentation-quality graphs integrated with all procedures ■ In-depth, comprehensive implementations of: *Exploratory techniques; Descriptive statistics; Frequency tables; Large selection of nonparametric tests; Stepwise multiple regression methods with extended diagnostics; General nonlinear estimation (with predefined or user-specified models); Logit/Probit analysis; General implementation of ANOVA/ANCOVA/MANOVA/MANCOVA (designs of practically unlimited complexity, repeated, nested, incomplete, random, changing covariates, contrast analyses, post-hoc tests, custom designs); Discriminant function analysis statistics; Canonical analysis statistics; Time series modeling techniques with forecasting; Factor analysis with rotations; Cluster analysis (incl. hierarchical, k-means, and 2-way joining); General survival/failure time analysis (incl. life tables, group comparisons, and regression models); Distribution fitting (a large selection of continuous and discrete distributions); Curve and surface fitting and smoothing (incl. spline, DWLS, NEXP, and others);* and much more ■ Manual with comprehensive introductions to each method and step-by-step examples (Quick Start booklet explains all major conventions); balloon help ■ Extensive data management facilities: a super-fast spreadsheet of unlimited capacity with formulas (and Publish and Subscribe); merge/split files; "double identity" of values (numeric/text); BASIC-like data transformations programming language; Import/Export data and graphs from/to Excel, MacSS, CSS and other formats ■ Graphs integrated with all procedures (e.g., click on a correlation coefficient to produce the corresponding scatterplot and other graphs; click on a variable in the descriptive statistics table to produce a histogram and other graphs; click on an interaction effect in the ANOVA table to see a plot of interaction) ■ Large selection of 2-dimensional graphs: *Histograms (incl. multiple, clustered breakdowns, overlaid functions), Scatterplots (incl. multiple, weighted frequency, smoothed, function fitting), Multiple line and Range plots, Trend plots, Standard deviation plots, Data sequence diagrams, Contour plots, Box-and-whisker plots, Column plots, Bar graphs, Double pie charts, Scrollable dendrograms, Two-way joining plots, Curve fitting plots, Distribution comparison plots, Range plots, Probability plots, Amalgamation plots, Factor space plots, Casewise outlier and residual diagrams, ANOVA interaction plots, Multivariate (multiple) matrix plots, exploratory Draftsman plots with histograms,* and many other specialized plots ■ Large selection of 3-dimensional graphs: *3D surface plots (with data smoothing procedures, color or gray-scale shading, and projected contours), 3D scatterplots, 3D block scatterplots, 3D axis (space) plots, 3D spectral plots with adjustable planes, 3D line/ribbon plots, 3D sequence block plots, 3D histograms, 3D surface-smoothed frequency plots, and 3D range plots ("flying boxes")* ■ All 3D plots displayed in true perspective, feature interactive real-time rotation facilities (incl. continuous rotation) ■ Extensive graph customization options: all structural aspects of graphs (axes, scaling, patterns, colors, sizes, styles, regions, perspective, rotation, fitted functions, etc.); MacDraw-style tools with specialized "objects"; hi-res graph and artwork embedding; page layout/preview; dynamic rulers; Publish and Subscribe graph links ■ All output displayed in Scrollsheets™ (dynamic, internally scrollable tables: all numbers can be instantly converted into a variety of on-screen customizable, presentation-quality graphs) ■ All Scrollsheets can be saved into data files and used for input, or exported ■ Flexible facilities to perform analyses on specific subsets of data ■ Extremely large analysis designs ■ Unlimited size of files ■ Extended precision ■ Unmatched speed (e.g., on a Mac IIfx, arbitrary rotation of a surface with 1,000 points takes 1 second; correlation matrix 50x50 with 100 cases—less than 3 seconds; transposing a 5,000 data points file—less than 2 seconds) ■ Full support for System 7 ("savvy") incl. "Publish and Subscribe," Apple events, balloon help, "drag and drop," 32-bit, Quadra cache, etc. ■ Price: **$595.**

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MACWORLD Star Ratings

QuickTime movies may not be for the casual user, but if you have the equipment and you can't live without spinning logos and superimposed shots, then go ahead and indulge. Jul 93

PROGRAMMING

★★★ **EdScheme 3.4 (4.0), Schemers, 305/776-7376, $49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create standalone applications. Nov 92

★★★ **EISToolKit 2.0, MicroStrategy, 302/427-8800, $1995.** Reliable, field-tested developer's environment for creating executive information systems provides automatic access to information in spreadsheets and databases across a distributed system, and serves up the information on screens that provide automatic graphing, analysis, and report generation. May 93

★★★★ **FutureBASIC 1.0, Zedcor, 602/881-8101, $299.95.** Complete, easy-to-learn, real-world programming tool has full Toolbox, System 7, and assembler support. It's a wonderful tool that's rapidly becoming a favorite among commercial developers. Jul 93

★★★ **MetaDesign for the Macintosh 3.0, Meta Software Corp., 617/576-6920, $250.** This diagramming tool for structured systems analysis offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at austere, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

★★★ **Object Logo Student Edition, Paradigm Software, 617/576-7675, $49.95.** This book-plus-disk package offers a wide-ranging introduction to programming concepts. It's aimed roughly at the high-school educational level and lets you see something happen for every few lines of code you type. Jul 93

★★★★ **Object Master 1.0.2, ACI US, 408/252-4444, $395.** Successful combination of the superior object-management facilities typically found in Smalltalk, and a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

★★★★ **PG:Pro 1.5, Staz Software, 601/225-7085, $169.** For part-time or novice programmers, the combination of these BASIC programming tools and FutureBASIC is a fast path to a working program. Jul 93

★★★ **Serius Programmer 3.0, Serius Corp., 801/261-7900, $395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

★★★★ **Think C 5.0, Symantec Corp., 408/253-9600, $299.** While not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. Jul 92

★★★★★ **Think Pascal 4.0, Symantec Corp., 408/252-3570, $249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

UTILITIES

★★★ **7th Heaven 2.5, Logical Solutions, 612/659-2495, $99.95.** Seven enhancements to System 7 include a file-copying accelerator, a file-mapping utility, a system-information collector, a screen saver, a simple calendar, a desktop-pattern editor, and a system-alert-icon changer. Our reviewer found them fun and elegantly done, but not all of them were useful. Jul 93

★★★ **Alki Seek 2.1, Alki Software Corp., 206/286-2600, $39.95.** Competent file-finding utility scans by file name or content and lets you combine multiple search criteria. It cannot search in the background or find text in compressed files. Jul 93

★★★★ **At Ease 1.0 (1.1), Apple Computer, 408/996-1010, $59.** Sweet, simple, secure substitute for the Finder displays a clean, attractive page full of oversize icons where a single click launches a program or document. To delete, rename, or move files, you have to return to the Finder. Mar 93

★★★ **AutoDoubler 1.0.7 (2.0.1), Salient Software, 415/321-5375, $89.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities. Sep 92

★★★ **Billy Steinberg's PBTools 1.0.1, Inline Design, 203/435-4995, $99.95.** If you want basic PowerBook management without added frills or complex menu bar displays, this collection of four utilities may be just your cup of tea. Jul 93

★★★★ **ClickChange 2.0, Dubl-Click Software, 818/888-2068, $89.95.** Interface-customizing package has nothing you need, but is filled with everything you want, including tools that let you alter major elements (cursors, menu bar, clock, buttons, scroll bars, windows, colors, patterns, and sounds) of the Mac's look-and-feel. Aug 93

★★★★ **Conflict Catcher and Other Innovative Utilities 1.0 (1.3.8), Casady & Greene, 408/484-9228, $79.95.** Enable or disable INITs and start-up items when you boot, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you own another INIT manager. Mar 93

★★★ **Copyright, CSG Technologies, 412/471-7170, $49.** If you can justify spending $49 purely for the sake of efficiency, this straightforward utility replaces the Finder's copy function, unobtrusively copying files to or from your Mac, in the background, while you move on to more interesting things. Apr 93

★★★ **CPU 1.0j (2.0), Connectix Corp., 415/571-5100, $99.** Indispensable items mix with trivial ones in this collection of utilities for the PowerBook. It's a relatively inexpensive way to turn any PowerBook owner into a full-fledged power user. Apr 93

★★★ **DiskFit Direct 1.0, Dantz Development Corp., 510/849-0293, $49.95.** Basic but efficient backup system is simple and painless enough to foster better backup habits in anyone who uses it. It doesn't back up to hard drives or tape drives. May 93

★★★ **Drive 7 2.3 (2.34), Casa Blanca Works, 415/461-2227, $79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

★★ **DynoPage 2.0, Portfolio Software, 408/252-0420, $89.95.** While this utility greatly simplifies the printing of booklets and double-sided pages, it doesn't support PostScript graphics, is incompatible with some popular applications, and has a buggy drag-and-drop feature. Jul 93

★★★★ **easyPrint 1.0, SF/O, 408/253-8081, $29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

★★★ **Hard Disk ToolKit Personal Edition 1.1.2, FWB Software, 415/474-8055, $79.** The more arcane features of the heavy-duty Hard Disk ToolKit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is included. Jan 93

★★★ **INITPicker 3.0 (3.02), Inline Design, 203/435-4995, $79.95.** This INIT manager's ability to load aliased INITs over a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

★★★★ **Inline Sync 1.0 (1.01), Inline Design, 203/435-4995, $129.95.** Keep the latest version of your work on your portable machine and your desktop Mac with this file-sync software. It's easy to install, easy to use, easy on the wallet, and does the job well. Mar 93

★★★★ **KidDesk 1.0, Edmark Corp., 206/556-8484, $39.95.** If you have young children who love to experiment with your Mac while you're busy elsewhere, this desktop environment is a fun way to provide easily navigable play while protecting your files and applications from the havoc that curious little fingers can wreak. Jun 93

★★★★ **Kiwi Power Menus 1.0, Kiwi Software, 805/685-4031, $39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and enabling you to change the font and size in the menus. Dec 92

★★★ **MacPalette II 2.2 (2.3), Microspot USA, 408/253-2000, $69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, $149.** The consistent, 3-D–style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

★★★★ **Magnet 1.0 (1.01), No Hands Software, 415/321-7340, $129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

★★★★ **MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, $149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

★★★ **More Disk Space 1.1 (2.1), Alysis Software Corp., 415/566-2263, $99.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

continues

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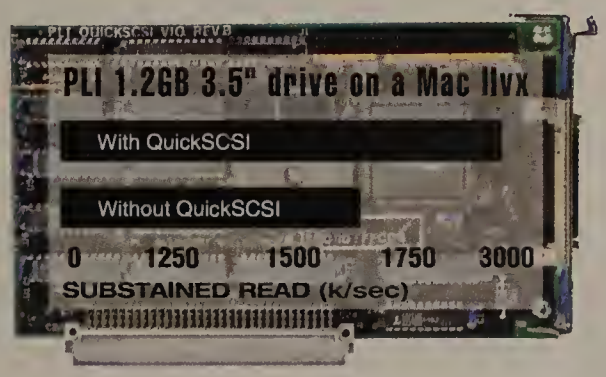

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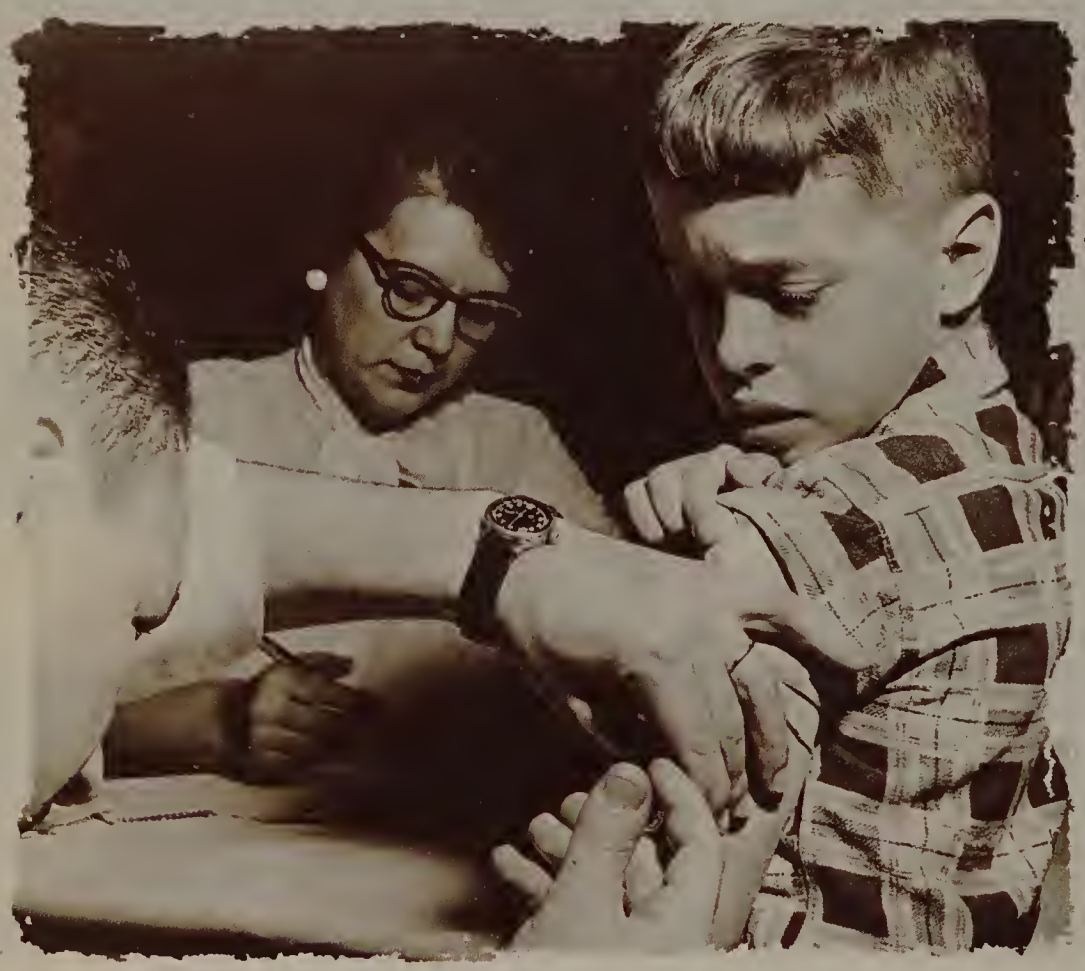
Circle 112 on reader service card

MACWORLD

Star Ratings

★★★ **NightWatch II 2.0.1b (2.01c), Kent Marsh, 713/522-5625, $159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

★★★★ **Nok Nok 1.0 (1.0.4), Trik, 617/933-8810, $49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac, alerts you when someone does connect, and sets time limits for file share users. Oct 92



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Circle 37 on reader service card

★★★ **Norton Essentials for PowerBook 1.0, Symantec Corp., 310/453-4600, $129.** Uneven collection of a dozen PowerBook utilities ranges from the unique and useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which purports to tell you the status of your battery. Apr 93

★★★★ **Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, $149.** Everything-including-the-kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

★★★★ **Now Utilities 4.0.1, Now Software, 503/274-2800, $129.** Many thoughtful improvements have been added to this collection of utilities, which is now better integrated, more logically designed, and still an excellent deal for your dollar. The new scrapbook feature, however, is awkward and inconvenient. Aug 93

★★★ **Peace of Mind 1.2.2, Polybus Systems Corp., 716/871-6533, $149.** Hardware diagnostic tool performs exhaustive batch, interactive, and benchmark tests on virtually all major Mac hardware components; does an excellent job of diagnosing simple simulated hardware errors (such as SIMM tweaking). The program has minor bugs and lacks a comparative test-history feature. Jun 93

★★★★ **PicturePress 2.5, Storm Technology, 415/691-6600, $199.** This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

★★★ **PowerMerge 1.0.2, Leader Technologies, 714/757-1787, $129.** File-synchronization utility has a potentially confusing interface, but is a handy means of updating selected files so that different Macs end up with identical versions of the selected documents. Apr 93

★★★ **Public Utilities for the Macintosh 1.0, Fifth Generation Systems, 504/291-7221, $149.** Utility program sticks to the basics of disk diagnosis, disk repair, and file optimization. It does a good, and in some cases unique, job, although disk optimization is slow. The technical support offered by Fifth Generation is excellent. Jun 93

★★★ **RapidTrak 1.0.1, Insignia Solutions, 415/694-7600, $99.95.** If you've got RAM to spare, this hard drive formatter offers driver-level RAM caching to store frequently used data and improve performance, especially on slower-speed drives. May 93

★★★ **Retrieve It 1.0, Claris Clear Choice, 408/987-7000, $49.** It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★ **Safe and Sound, Central Point Software, 503/690-8090, $49.95.** Limited but useful disk-protection and -salvage utility has a clean, simple interface and is an efficient emergency recovery tool. Jun 93

★★★ **Silverlining 5.4, La Cie, 800/999-3919, $149.** Extensive and detailed testing is only one of many advanced functions offered by this hard drive–management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0, Golden Triangle Com-**

continues

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MACWORLD

Star Ratings

puters, 619/279-2100, $129. For day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★★ **SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, $70.** Get Info gets faster with this CD-ROM–access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD-ROM folders, this product might save you enough time for it to be worth the $70. Nov 92

★★★ **Square One 1.5.2, Binary Software, 310/582-8293, $74.** Flexible, attractive icon-based file launcher provides infinitely customizable palettes, including one that displays active applications. The manual could use some help, and the application will consume 400K of your system memory. Aug 93

★★★★ **Star Trek: The Screen Saver, Berkeley Systems, 510/540-5535, $59.95.** Go where no Mac has gone before with this screen saver based on the original "Star Trek." Modules vary from simple messages in "Trek"-inspired fonts to an endless parade across the ship's main screen of aliens, spacecraft, and artifacts from different episodes. May 93

★★★★ **StuffIt Deluxe with SpaceSaver 3.0, Aladdin Systems, 408/761-6200, $120.** Its many conversion tools, able feature set, automatic compression capabilities, reliability checks, and acceptable performance make this product the jack-of-all-trades of compression utilities. Aug 93

★★★ **Super 7 Utilities, Atticus Software, 203/324-1142, $99.95.** Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★ **SuperDuper 1.7, NeoConcepts, 408/899-4821, $79.** If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

★★ **TimesTwo 1.0.1, Golden Triangle Computers, 619/279-2100, $149.** Automatic disk-compression utility operates at the disk-driver level rather than as an operating system add-on. A number of quirks, such as its ungraceful handling of full disks, are problems. May 93

★★★★ **UpDiff 1.0, KyZen Corp., 609/354-3863, $169.** Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. Dec 92

★★★ **Voice Navigator SW 2.3, Articulate Systems, 617/935-5656, $399.** Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★ **WonderPrint 1.0, Delta Tao Software, 408/730-9336, $59.** StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

VERTICAL MARKETS

★★★ **Compare-A-Loan 4.0.2 (4.1), Softflair, 612/894-3357, $79.95.** Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Its reports compare payback schedules of various home-loan options. Apr 93

★★ **ConstructionMac 1.2 (2.5), Revelar Software, 801/485-3291, $159.** With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

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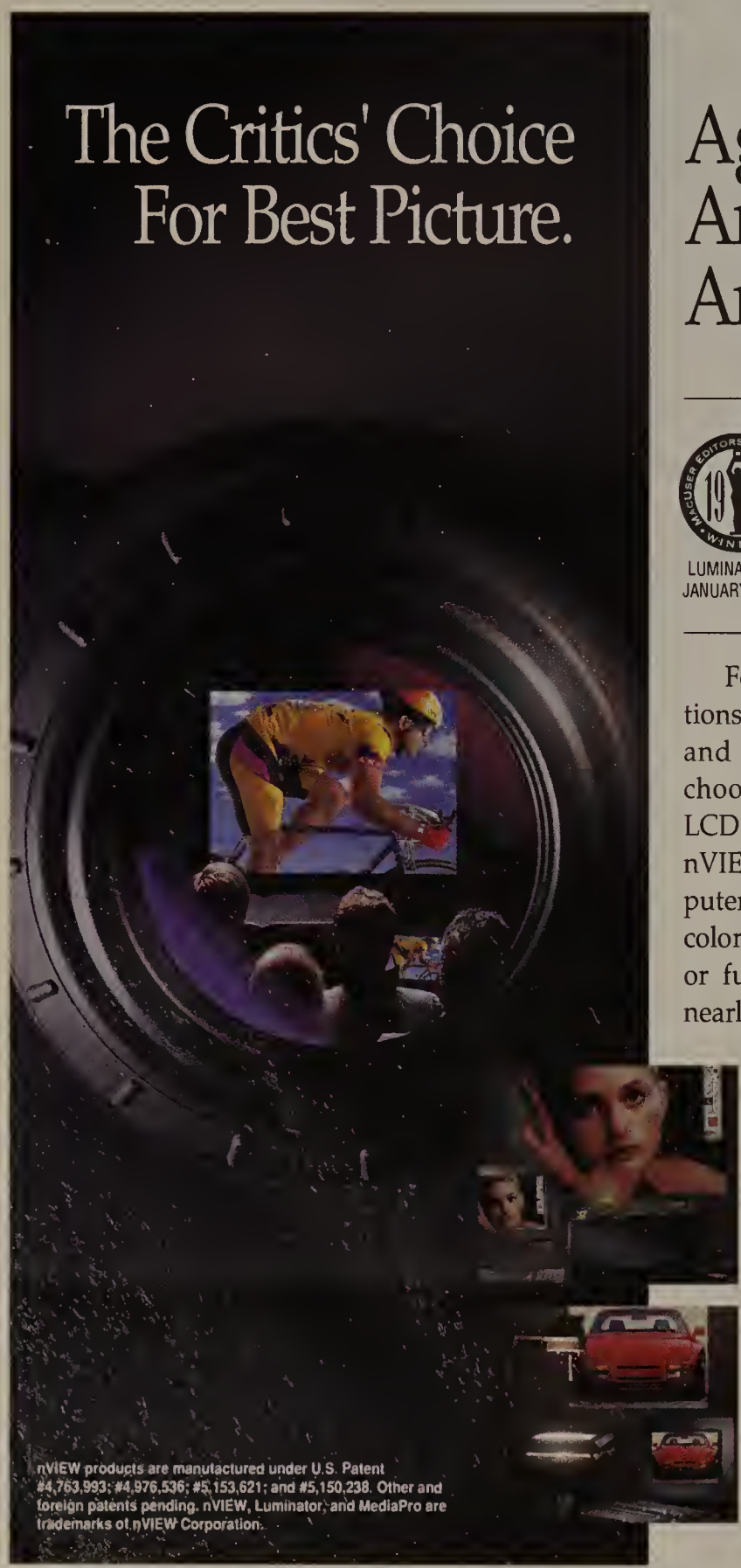

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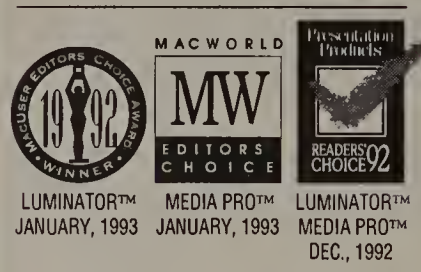

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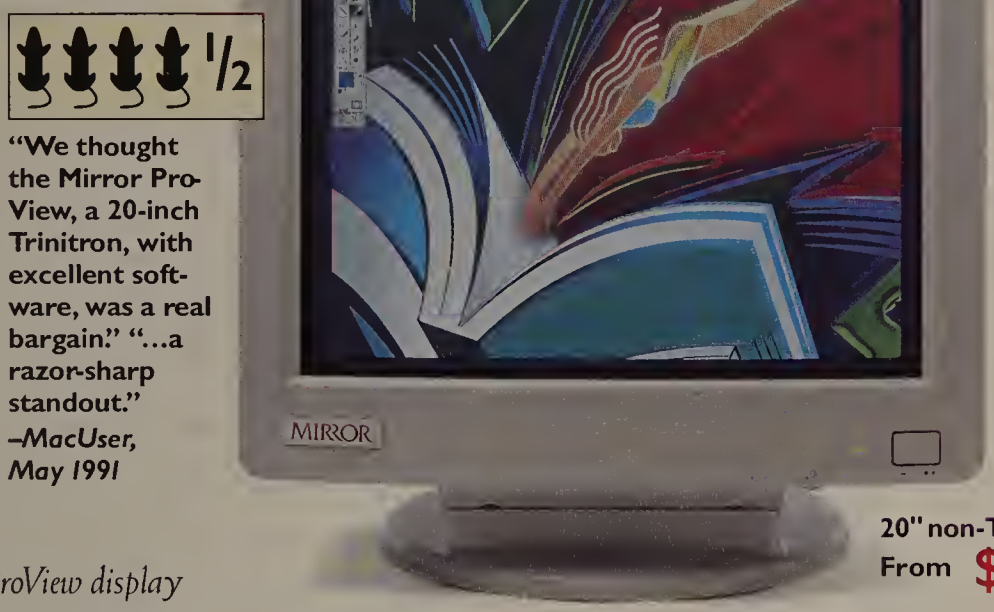

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MACWORLD **Star Ratings**

★★★★ **Diet Balancer 1.0 (1.05), Nutridata Software Corp., 914/298-1308, $69.95.** Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★★ **Expert Home Design 1.0 (1.0.3), Expert Software, 305/567-9990, $49.95.** Quickly and easily create home- or office-interior layouts that are precise, but not as detailed as blueprints, with this interior design software that includes a large furniture library. It doesn't do automatic side views, or offer ⌘-*key* access to library objects, but it's a good value nonetheless. May 93

★★ **Expert Landscape Design 1.0 (1.0.2), Expert Software, 305/567-9990, $49.95.** Bare-bones drawing environment for experimenting with landscape design is inexpensive, but its usefulness is severely limited because of awkward color and pattern tools and because it doesn't identify plant types. Feb 93

★★★★ **Grade Machine 5.0, Misty City Software, 800/795-0049, $79.** Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★ **JobTracker 2.02 (2.5), InfoSolutions, 814/355-2983, $395 to $844.** Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92

★★★ **LoanLease Library 3.0.3 (3.05), Softflair, 612/894-3357, $99.95.** If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★ **Making the Grade 2.0 (2.2), Jay Klein Productions, 719/591-9815, $99.95.** The Macintosh version of the Apple II program Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn; but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, $159.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92

★★★ **Roll Call 2.0, By the Numbers, 603/927-4508, $495.** 4th Dimension database application for church management helps track donations, attendance, church-group membership, and visitation. While not a complete church-management system, it's an acceptable complement to a general accounting program. Aug 93

★★★ **Stat-Ref 3.2a (3.2b), Teton Data Systems, 307/733-5494, $95.** Medical database on CD-ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WRITING TOOLS

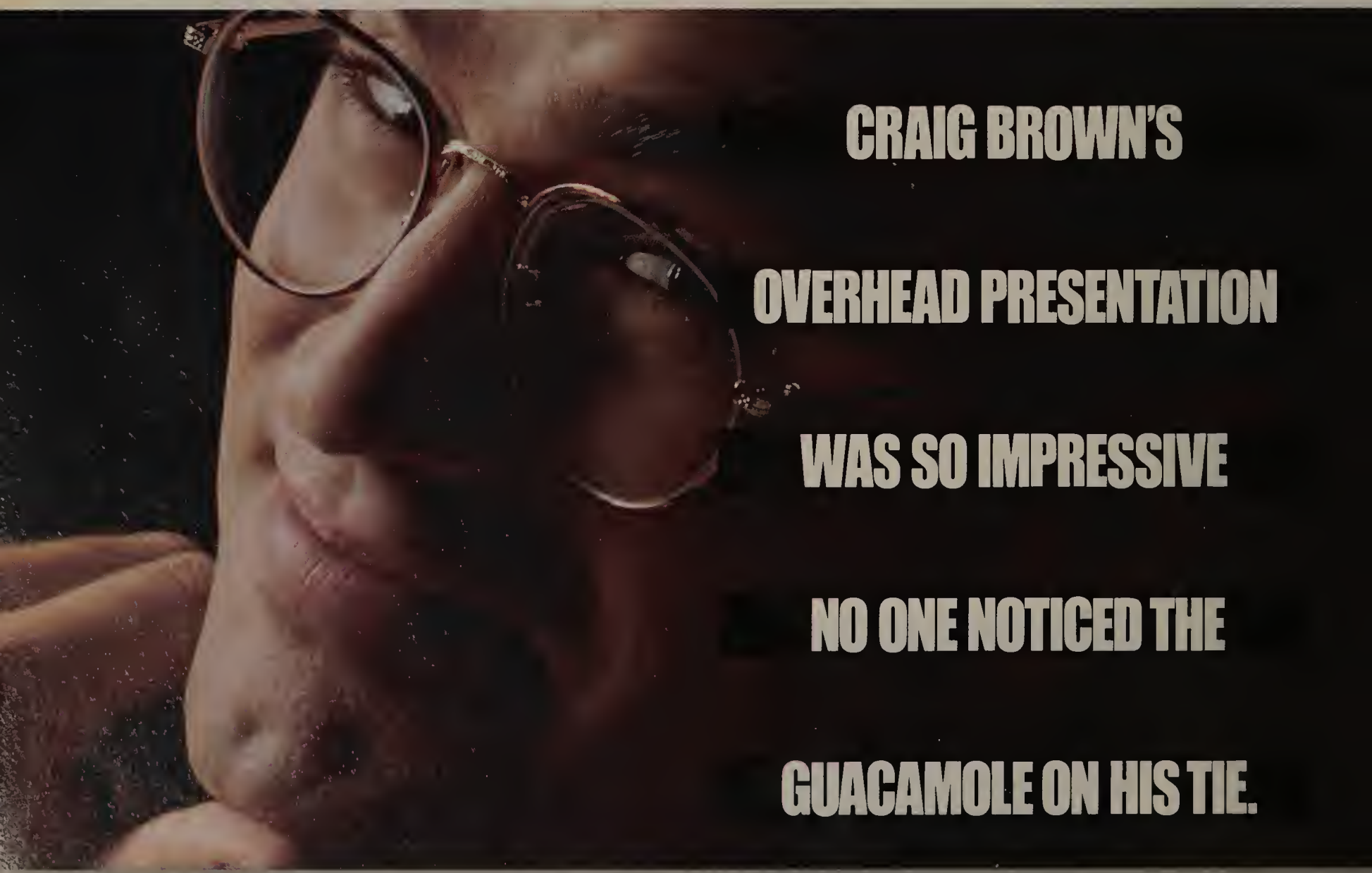
★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, $49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. Sep 92

★★★ **DocuComp II 1.0 (1.05), Advanced Software, 408/733-0745, $179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. Nov 92

★★★★ **EndNote Plus 1.2 (1.3), Niles and Associates, 510/649-8176, $249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, a significant enhancement to an excellent product. Sep 92

★★★★ **Final Draft 2.0 (2.0.3), MacToolkit, 310/395-4242, $349.** Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script, including dialogue, action, and slug lines (scene headings). Customization is easy, and macros automate typing of common phrases. Apr 93

★★★ **IdeaFisher 2.0, Fisher Idea Systems,**



714/474-8111, $595. Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. Jan 93

★★★ **Just Joking 1.0, WordStar International, 415/382-8000, $49.** HyperCard stack of around 2800 humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **MacWrite Pro, Claris Corp., 408/987-7000, $249.** Many of the new features of this upgrade are very well executed, including the easy-to-use table feature, simple but elegant palettes, and an almost pain-free mail merge feature. The program could still use some polish, however. Jul 93

★★ **MasterWord 5.1, Alki Software Corp., 206/286-2600, $99.95.** The centerpiece of this package of add-on Microsoft Word commands is a set of customizable tool bars that are obviously the product of a lot of thought and effort. Unfortunately, rough edges remain, including inaccuracies in the documentation and some features that don't work as advertised. Aug 93

★★★★ **Microsoft Word 5.1, Microsoft, 206/882-8080, $495.** Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it won't give Word 5.0 users goosebumps. Mar 93

★★★ **RightWriter for the Mac 5.0, Que Software, 317/573-2500, $99.95.** Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable writing-style filters and multiple approaches to analysis are nice, but—as with all grammar checkers—not all of the program's advice is great. May 93

★★★ **ShowScape 4.1, Lake Compuframes, 914/941-1998, $429 to $679.** This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★★★ **TypeReader 1.0, ExperVision, 408/428-9988, $695.** Speed and accuracy combine with a straightforward operating style in this high-end optical character-recognition software that doesn't do everything its competition does, but is a major contender nonetheless. Feb 93

★★★ **VersionMaster 1.5, AStar Technologies, 508/486-8532, $199.95 to $1199.95.** Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It's recommended only for workgroups that routinely follow check-out procedures and that don't need detailed reports of the changes to a file. Apr 93

★★★ **WordPerfect for Macintosh 2.1 (2.1.3), WordPerfect Corp., 801/225-5000, $495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★★ **WriteNow 3.0, WordStar International, 415/382-8000, $119.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

HARDWARE

INPUT DEVICES

★★★ **A³ Mouse, Mouse Systems Corp., 510/656-1117, $134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attrac-

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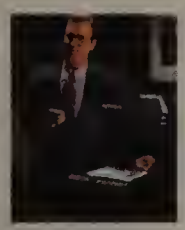

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Circle 45 on reader service card

MACWORLD **Star Ratings**

tive package; the software's incompatibilities and limitations are a problem. Jun 92

★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, $149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

★★ **Apple Adjustable Keyboard, Apple Computer, 408/996-1010, $219.** Adjustable keyboard is a slight improvement on the flat slab keyboard, but hopefully it won't be the last. Theoretically, it corrects a crook in the wrist known as ulnar deviation, but many sufferers of repetitive stress injuries are still hoping for a keyboard that adjusts on a vertical plane. Jul 93

★★★★ **ArtZ ADB Tablet, Wacom Technology Corp., 206/750-8882, $449.** Combining pressure-sensitive operation, manageable size, and a new pencil-thin stylus, this affordable digitizing tablet is perfect for artists looking for traditional-style control of their graphics programs. Aug 93

★★★★ **The Bat, Infogrip, 504/766-8082, $495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. Oct 92

★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, $645, $395.** Two likable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Jul 92

★★★ **Mouse-Trak, Itac Systems, 214/494-3073, $179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

★★★ **MouseMan, Logitech, 510/795-8500, $129.** Bear-paw–shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

★★★ **TrackMan, Logitech, 510/795-8500, $99.** Trackball with three programmable buttons and a handy click-lock feature has a right-hand bias. Jun 92

★★★★ **Turbo Mouse 4.0, Kensington Microware, 415/572-2700, $169.95.** Large buttons on either side of this trackball provide just the right measure of tactile feedback; the removable ball glides freely. But the breakthrough feature is the software that lets you customize many of the trackball's functions. Nov 92

★★★ **The UnMouse, MicroTouch Systems, 508/659-9000, $199.** Input device is a cursor-control device, programmable keypad, and small graphics tablet in one, and can be programmed with 60 macros (although only 16 can be selected by sight). It's ergonomically better than a mouse, but not as good as a trackball. May 93

★★★ **Z-Nix Cordless SuperMouse, DynaPoint, 818/854-6440, $99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). Dec 92

MISCELLANEOUS HARDWARE

★★★ **AC5300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, $400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. Nov 92

★★★★ **AppleCD 300, Apple Computer, 408/996-1010, $599.** Double-speed CD-ROM drive spins its discs at twice the speed of earlier drives, providing faster access to large files. It also reads multisession Photo CDs. Jun 93

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, $329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. Jun 92

★★★ **Mac5peaker M5-1, Monster Cable, 415/871-6000, $229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

★★★★ **Media Control Station 1.0 (1.01), JLCooper Electronics, 310/306-4131, $269.95.** This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data. Feb 93

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, $419.95.** This painstakingly crafted music and piano instruction package comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. Oct 92

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, $34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, $129.99.** If you own a 5000-, 7000-, or 8000-series Sharp Wizard, this program and cable let you connect the Wizard to a Macintosh serial port to exchange data. It's functional, but has some minor weaknesses. Jan 93

★★★ **PhonePro 1.0.3 (1.1.5), Cypress Research Corp., 408/752-2700, $950.** This application makes it relatively easy to develop a multiple-choice voice-mail system using your Macintosh, especially for those with programming backgrounds. The product includes a 9600-bps modem and a headset/microphone. Feb 93

★★★★ **PowerKey 2.0 (2.01), Sophisticated Circuits, 206/485-7979, $119.** Ingenious, well-designed automated power strip has four surge-protected outlets controlled by the keyboard's on/off switch. The clever software can turn on a Mac, unattended, run a QuicKeys macro (QuicKeys Lite included), and shut down again. Dec 92

★★★ **Yamaha TG100, Yamaha Corp. of America, 714/522-9011, $449.** Compact, keyboardless, multitimbral MIDI synthesizer with built-in MIDI interface adheres to the life-simplifying General MIDI standard patch arrangement. Although it won't convince you that you're hearing a live orchestra, the sound is about as realistic as low-cost MIDI gets. Apr 93

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, $295.** Unusually well designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. Jun 92

★★★ **Comstation 4, PSI Integration, 408/559-8544, $495.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. Jun 92

★★ **EtherPrint 1.0 (2.0), Dayna Communications, 801/531-0600, $499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. Dec 92

★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, $599.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, $695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

★★★★ **PathFinder, Dayna Communications, 801/531-0600, $899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

★★★ **PowerModem, PSI Integration, 408/559-8544, $299.** Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, $499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. Dec 92

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, $329.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than average. Feb 93

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, $399.95.** Send and receive faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, $499.** When it can reliably transmit data at high speeds and the bugs are fixed, this fax modem with voice mail will be worth a second look. Oct 92

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, $299.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, $499.** Only slighter larger than a deck of cards, this 9600-bps modem is geared toward PC users,

continues

1.

5.

DON'T CALL ORKIN.*

When the Mac first came around, everybody loved its *little rodent.* No cursor up. No cursor down. Man, what a handy device. Then people got into graphic arts. Whoops. *Mousetrap!* INTRODUCING ARTZ.™ The flashy, jammin', way cool ADB graphics tablet from Wacom. ArtZ simply *plugs into your ADB port* and lets you create graphics using a cordless, batteryless, pressure-sensitive stylus, about the size and weight of a fine pen. Now, creating art on a computer is as *natural* as creating art on a note pad, a canvas, or even a subway. To see just how flashy and way cool the ArtZ is, TAKE THIS SIMPLE TEST: *(1)* Cut out the mouse at the top of the page. Blow it up if you like. Now *(2)* *trace it* with the mouse on your computer. Then *(3)* print it, and *(4)* scurry on down with both to your local Wacom dealer. Don't know where one is? Just call *1-800-922-6613.* When you get there, *(5)* trace the mouse on an ArtZ. *Feels good,* doesn't it? Now *(6)* print it and *(7)* compare the two. OK? Now *(8)* pull out your pocketbook. You've been doing *mickey mouse art* long enough.

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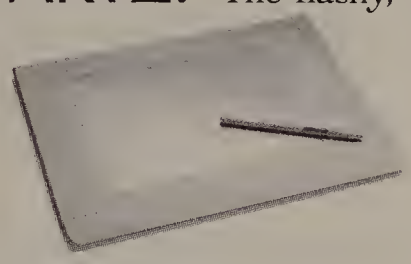

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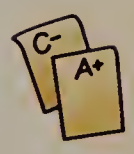

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8.

*For the mice that run on a Mac, you can't call for pest control. But for the mice that run on top of a Mac, and under a Mac, and in the cupboards and stuff, call these guys: Orkin Exterminating.

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MACWORLD

Star Ratings

with a user guide that never mentions Macs and software that is only for PC compatibles. Jan 93

PRINTERS

★★★ **Apple Color Printer, Apple Computer, 408/996-1010, $2349.** If you need large-format color output, but not precision color-matching, this well-built printer is a reasonable choice, although it doesn't support PostScript. If you can do without the large-format output, you can find comparable printers at a far better price. Aug 93

★★ **C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, $2395.** Not only is this laser printer more expensive than most personal page printers, it also offers less-impressive features and so-so output. Nov 92

★★★★ **DEClaser 1152, Digital Equipment Corp., 508/493-5111, $999.** Four-pages-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Macs and PCs, plus excellent image quality, for a ground-breaking price. The internal font set is small, and the included 2MB of memory is not enough to print complex images. May 93

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, $2399.** An Intel i8960 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. Feb 93

★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, $2795.** The output of this color inkjet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. Oct 92

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, $2499.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under $3000. Aug 92

★★★ **LaserWriter Pro 600 and 630, Apple Computer, 408/996-1010, $2099 to $2529.** From their paper handling to their print quality, these laser printers are Apple's best printers, as well as the best printers available in their price range. Unfortunately, they don't support emulation-sensing, and thus may be less desirable for mixed-platform offices than other possibilities. Jun 93

★★★★ **LaserWriter Select 300, Apple Computer, 408/996-1010, $839.** Inexpensive, low-capacity printer is networkable, and an excellent buy, despite a few weaknesses. Add a 4MB SIMM to take advantage of the amazing PhotoGrade capabilities, which allow the printer to generate 91 shades of gray. Aug 93

★★ **LaserWriter Select 310, Apple Computer, 408/996-1010, $1099.** This big, slow printer is a true Adobe PostScript printer with both Mac and DOS ports, but it's not networkable or compatible with the Communications Toolbox, it can't automatically switch ports, and it doesn't have adjustable paper guides or a preview feature. Aug 93

★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, $3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. Sep 92

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, $2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. Jul 92

★★★ **Phaser 200i Color Printer, Tektronix, 503/682-7377, $5995.** This thermal-wax color printer is fast and compact, with versatile paper-handling features. TekColor image-enhancement technologies provide excellent output quality that is, however, poor on letterhead and inexpensive photocopier bond. An additional $99 paper cassette is required to use plain paper. Aug 93

★★ **PrintPartner 10W, Fujitsu Computer Products, 408/432-6333, $2450.** While this multiplatform

continues

Circle 71 on reader service card

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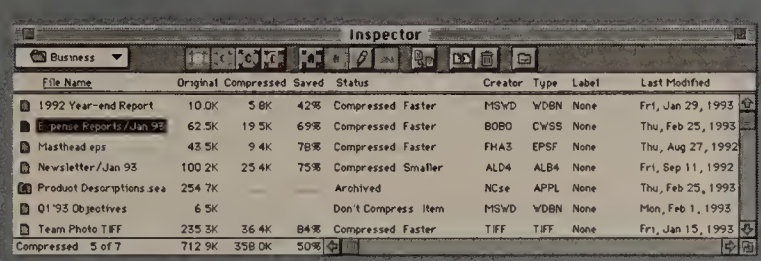

What's more, it decompresses so quickly you won't notice when you're working with compressed data.

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MACWORLD

Star Ratings

printer is fast, relatively inexpensive, and prints clearly, many Macintosh users will find it more frustration than it's worth; it can't print TrueType fonts that are not stored internally, including some that are shipped as part of System 7. **Jul 93**

★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, $8999.** The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. **Oct 92**

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, $3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. **Sep 92**

★★★★ **StyleWriter II, Apple Computer, 408/996-1010, $359.** Apple's ink-jet printer retains the best features of its predecessor, but costs less. New features, such as gray-scale printing and the ability to share the printer over a network, make it even more versatile. **Jun 93**

★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, $1649.** An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra $500 is worth it. **Jul 92**

★★★ **WideWriter, GCC Technologies, 617/275-5800, $1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. **Feb 93**

★★★ **WriteMove II, GCC Technologies, 617/275-5800, $599.** Portable printer for the PowerBook measures 11½ by 2 by 3½ inches and weighs 2½ pounds. It's no speed demon, but it's fine for short jobs. **May 93**

SCANNERS

★★★★ **Apple Color OneScanner, Apple Computer, 408/996-1010, $1349.** Tests of this impressive color scanner demonstrate unpolluted colors and sharp image details, perhaps due to color filters and lenses that Apple claims were specially designed and tuned for the scanner. **Jul 93**

★★★★ **Epson ES-800C, Epson America, 310/782-0770, $1499; Macintosh interface kit $399.** Flexible 400-dpi scanner offers an impressive range of options, including a choice of one- or three-pass scanning, plus a full-featured easy-to-use software package that includes a Photoshop plug-in, a QuarkXPress extension, and a desk accessory that lets you scan an image from the Apple menu. **Aug 93**

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, $879.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around $750. Muddled online help and a flimsy hinge are minor problems. **Aug 92**

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, $649.** Well-executed hand-held gray-scale scanner creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. **Jun 92**

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit $9535, 24-bit $11,316.** The bread-box–style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. **Sep 92**

★★ **PageBrush Professional 1.0 (1.02), Mitsubishi International, 415/544-2781, $795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. **Jun 92**

SYSTEMS/STORAGE

★★★★ **FastCache Quadra, Daystar Digital, 404/967-2077, Quadra 950/900/700 version $449, Quadra 900/700 version $299.** PDS board provides 128K of secondary cache for a Quadra with 15ns static RAM (25ns on 900/700). The average real-world speed improvement is 15 percent, but some operations benefit more from the cache card than others. **May 93**

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, $545.** It is easy to recommend this floptical drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. **Sep 92**

★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, $582.** The good points of this floptical drive include extensive documentation, switchable termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. **Sep 92**

★★★ **Infinity Optical 3.5, Peripheral Land, 510/657-2211, $1999.** If you need the extra measure of permanence that magneto-optical storage provides—or you want a compact alternative to bulky cartridges—this drive, based on a Sony mechanism and using 3½-inch disks that store 120MB of data, deserves a look. **Jun 93**

★★★ **Macintosh Centris 610, Apple Computer, 408/996-1010, 4/80 $1859.** Slim-design Mac uses a 20MHz 68LC040 processor at a price-to-performance ratio that comes close to competing with Windows PCs; however, its expandability is severely limited. **Jun 93**

★★★★ **Macintosh Centris 650, Apple Computer, 408/996-1010, 4/80 68LC040 $2699.** Moderately priced but fast 040 system offers three expansion slots and one drive bay, and (except for the base model) has built-in Ethernet, video circuitry, and a math coprocessor. This desktop Mac is as powerful as a Quadra 700 and two times as fast as a IIci. **Jun 93**

★★★ **Macintosh Duo Dock, Apple Computer, 408/996-1010, $1079.** Immensely clever desktop-Mac–size housing for the Duo laptops provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of installing NuBus boards, belie Apple's usual attention to detail. **Mar 93**

★★★★ **Macintosh LC III, Apple Computer, 408/996-1010, 4/80 $1349.** Base system comes equipped with a 25MHz 68030 processor, 4MB of RAM soldered to the logic board, an 80MB internal drive, and 512K of VRAM. This is a machine that fits the bill and the

continues

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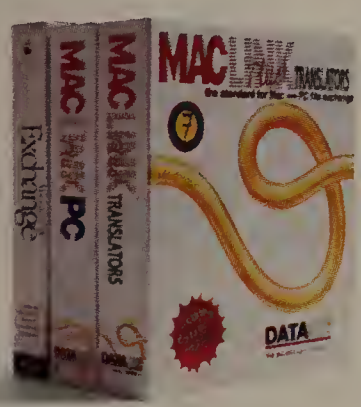

Macintosh PC Exchange makes DOS disks appear on the Mac desktop and shows their contents as Macintosh files and folders. New Macintosh Easy Open is a System 7™ extension that helps you open Mac or PC files when the application that created them isn't on your Mac. These technologies from Apple teamed with our translators offer the most complete solution to file transfer and translation available in a single package.

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MACWORLD Star Ratings

pocketbook of most home or small-business owners. Jul 93

★★★ **Macintosh Power8ook 145, Apple Computer, 408/996-1010, 4/40 $2149.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

★★★★ **Macintosh PowerBook 160, Apple Computer, 408/996-1010, 4/40 $2429.** A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use. Feb 93

★★ **Macintosh Power8ook 165c, Apple Computer, 408/996-1010, 4/80 $3399.** The passive matrix screen of this color notebook computer is dull and has noticeable afterimages, but if your expectations are reasonable, the speedy processor provides a pleasant environment in which to work. Jul 93

★★★★ **Macintosh Power8ook 180, Apple Computer, 408/996-1010, 4/80 $4109.** An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra $1000. Feb 93

★★★★ **Macintosh PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) $1839, 230 (4/80) $2299.** Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackmarble") feel small, these computers virtually cry out to be picked up, handled, and used. Mar 93

★★★★ **Macintosh Quadra 800, Apple Computer, 408/996-1010, 8/230 $4679.** Squat, yet curvy and attractive, this minitower system has fewer expansion opportunities than the Quadra 950, but just as much power. It's fast, slick, and moderately priced. Aug 93

★★★ **MicroMac Plus Upgrade 5ystem, MicroMac, 714/362-1000, $998.** This 68030 accelerator for the Mac Plus requires disassembling a Plus and using the Plus system board to assemble the MicroMac system. It speeds up the Plus dramatically, and supports an included external full-page monochrome monitor. Jun 93

★★★★ **MultiDisk 150, Iomega, 801/778-1000, $1225.** Durable cartridges are one of the strongest reasons to choose this Bernoulli removable drive. Although the drive is slightly more expensive than a SyQuest drive, it's fast and reliable, and the disks are competitively priced. Jun 93

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, $2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. Oct 92

★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, $4999, $6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. Jan 93

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis $469, 240MB drive $979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive solves the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

★★★★ **Radius Rocket 33, Radius, 408/434-1010, $2499.** The accelerator board of choice for our reviewer, this 68040, 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROM), IIx, IIcx, or IIci. Oct 92

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, $2595.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. Oct 92

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, $1399 (includes 6MB of RAM).** This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

★★★ **L-TV, Lapis Technologies, 510/748-1600, $349.** Interface board allows a Mac LC, LC II, or Performa to use a standard television monitor as a display device. Unfortunately, a standard television is a poor substitute for a color monitor, so while the L-TV does its job adequately, the setup is unsuitable for many applications. May 93

★★★ **Lightning Effects II, Spectral Innovations, 408/955-0366, $1295.** Digital-signal-processor chips dramatically speed up some Photoshop operations with this expensive Photoshop-acceleration board. It had problems acquiring some JPEG files. May 93

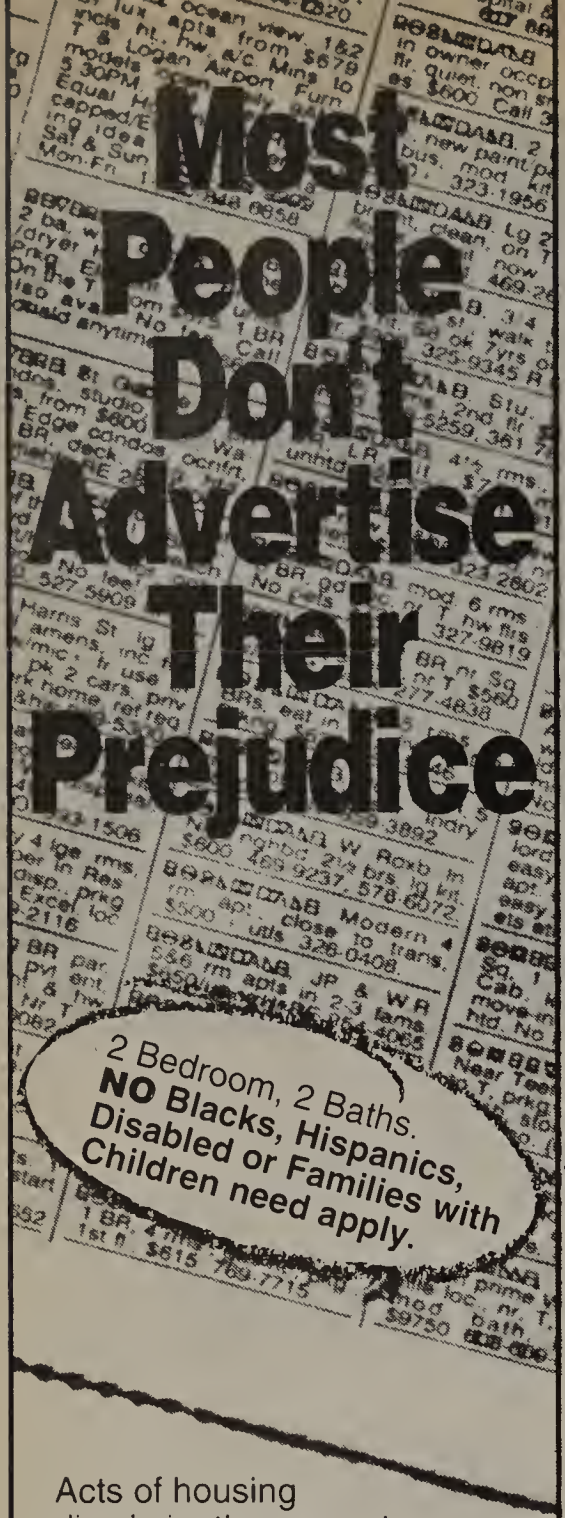
★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, $1459.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. Jun 92

★★★ **Power Portrait, 5igma Designs, 510/770-0100, $899 or $949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, $499 to $999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. Feb 93

★★★★ **Thunder5torm, SuperMac Technology, 408/245-2202, $699.** Photoshop-acceleration board uses digital-signal-processor chips to speed up some Photoshop operations. It's fast, with good JPEG compatibility and a great manual. May 93

★★★★ **VideoSpigot, 5uperMac Technology, 408/245-2202, $449 to $1299.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92 m



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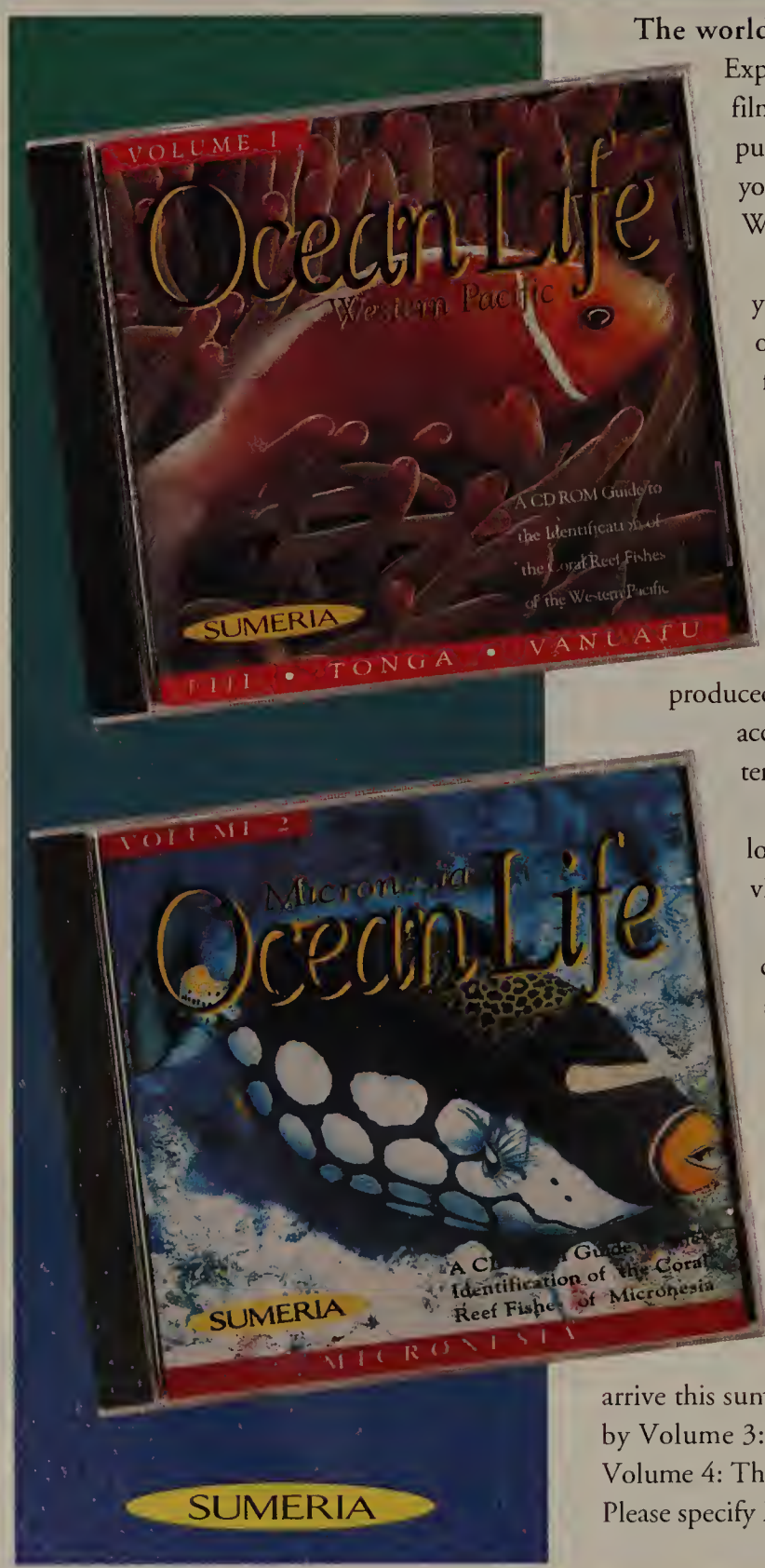

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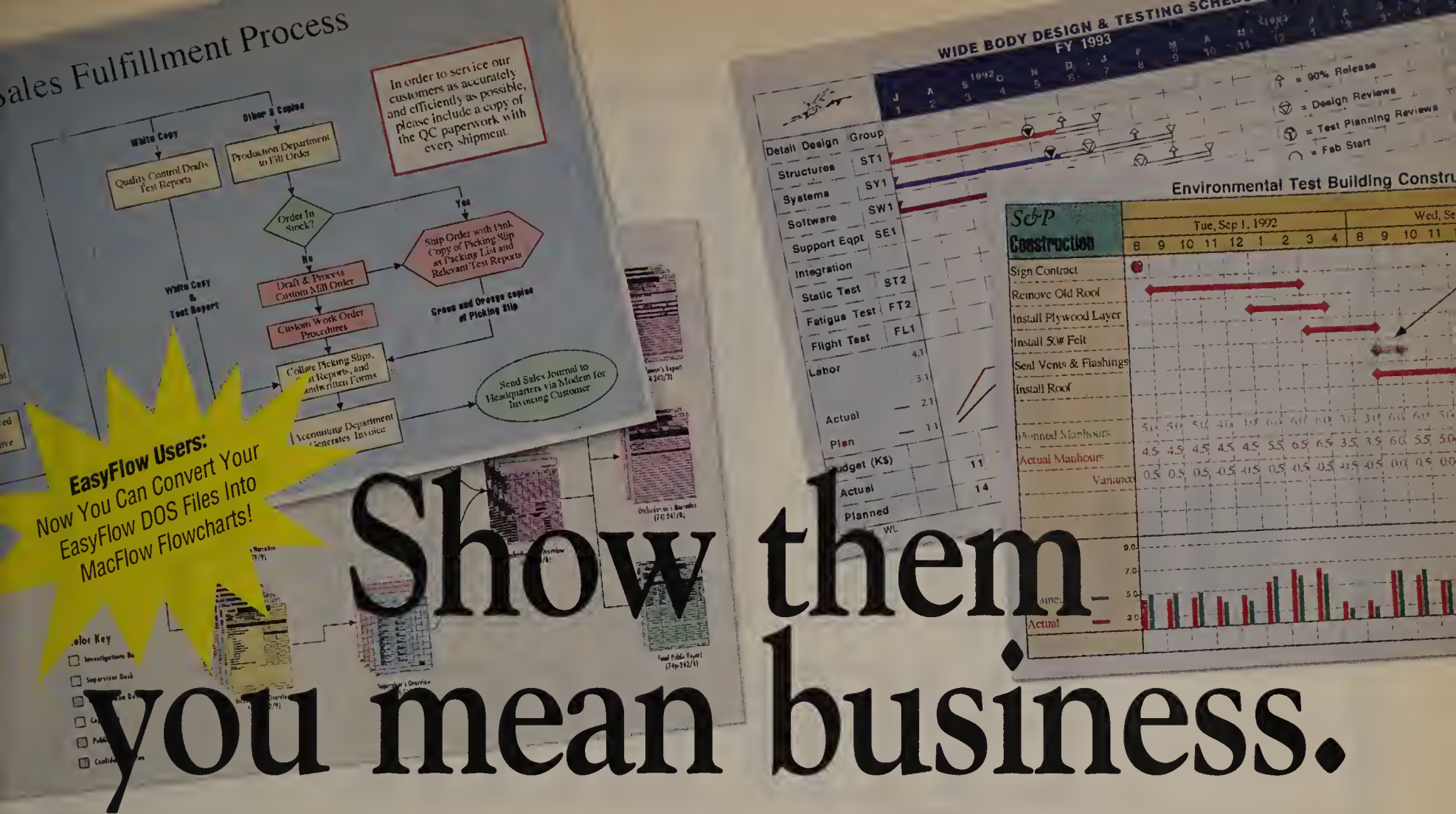

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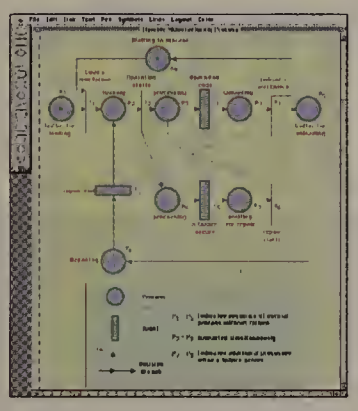


Lay it all out for them—the process, the procedures, the relationships. Business works best when everything is clear, and there is no better way to make things clear than a detailed flowchart.

The best way to create flowcharts is MacFlow—the highest-rated flowcharting program. Neither drawing programs nor pencil and paper can create flowcharts as easily as MacFlow. And no program is simpler to learn or use. Graphically organize complex processes, projects, and structures—minutes after opening the package.

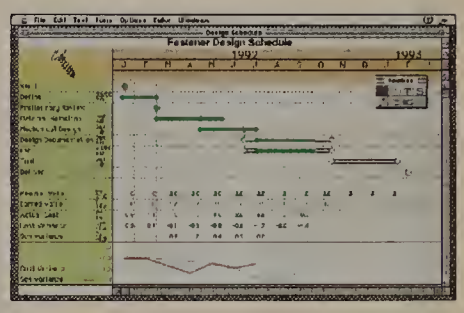
Simply drag pre-drawn symbols onto a page and connect with curved or straight lines. Place text in symbols and on lines, as well as in freestanding notes. Change the chart as desired; lines stretch and stay attached to symbols. Even create stand-alone flowcharts that can be freely distributed to any Macintosh user (and any Windows user with an optional viewer). MacFlow is also System 7-savvy, letting you publish your charts and subscribe to text. Translate to and from text in ASCII and RTF formats as well as outlines created in Acta 7 and MORE.

MacFlow actually enhances your thought process because the interface is so simple and intuitive, nothing stands between your ideas and a presentation-quality flowchart. In fact, you'll find just creating flowcharts keeps your thoughts organized and helps you get a handle on any task.

Show them you're serious—get MacFlow today.

MacUser Magazine July '91

MacSchedule 3.0
Project Planning and Tracking



Lay it all out for them—the plan, the people, the cost. Give them a path to follow and a way to track progress. Successful projects need a roadmap, and nothing can beat a simple yet comprehensive project schedule.

The best way to create quick, presentation-quality project schedules is MacSchedule. The Gantt-chart interface lets you create schedules, with integrated financial data, minutes after you open the application—unlike complex project management software. And MacSchedule is as easy to learn as it is to use.

MacSchedule automatically creates and manages a project calendar. Just enter task names, then indicate timing with a click and drag of the mouse. Status tracking is also easy—just click on a task bar to show progress.

MacSchedule helps track a project from initial estimates to current status by automatically developing calendarized cost estimates and reporting cost and schedule variances in an Earned Value summary. MacSchedule is also System 7-savvy, letting you publish your schedules and data as well as subscribe to data from other programs. Place schedules in documents for proposals and reports or print schedules as slides, overheads, or wallcharts.

With MacSchedule's graphic feedback, you can tell at a glance where your project is and where it's headed. It's the perfect tool for any manager.

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Streetwise Shopper

SPECIAL HARDWARE AND SOFTWARE BUYING OPPORTUNITIES

Selected and edited by Charles Barrett

The following special product promotions are being sponsored by Macintosh vendors and resellers for a limited time only. When ordering a product, please tell the vendor or reseller that you saw the promotional offer in *Streetwise Shopper*. Should you experience any problems, please advise us by fax, 415/442-0766, or by mail: Streetwise Shopper Editor, *Macworld*, 501 Second St., San Francisco, CA 94107.

Product listings indicate the star rating awarded in *Macworld's Reviews* (products rated ★★ or lower are not eligible to be listed), if the product has been chosen as an Editors' Choice, and if it has won a World-Class award. Please note that in some cases the editorial evaluation quoted is for an earlier product version.

BUNDLES

Color-It 2.0.2 + MacGolf Classic 1.1 MicroFrontier (800/388-8109) is bundling its $149.95 color paint program (Apr 93 ★★★ review for version 2.0.1—"equipped with a full range of painting and image-retouching capabilities") with XOR Corp.'s $94.90 true-to-life 3-D golf simulation, with six of the toughest golf courses you'll ever play, for $119.95. *Exclusive* Macworld *offer expires 10/31/93.*

Fontographer 4.0 + Pixar Typestry 1.1 Altsys Corp. (800/477-2131) is bundling its $495 font-design software (Nov 92 ★★★★ review for version 3.5—"an essential tool for experts") with Pixar Corp.'s $299 3-D type-effects and animation program (Nov 92 ★★★ review for version 1.0—"superb image quality," "reasonably priced") and making the bundle available direct or through Macintosh mail-order companies for $289 to $309. *Offer expires 12/31/93.*

PowerPad + CPU 2.0 Sophisticated Circuits (800/769-3773) is bundling its $115 PowerBook numeric keypad with Connectix Corp.'s $99 PowerBook utility (Sep 93 ★★★★ review—"indispensable and reasonably priced") for $89. An extension of a Boston Macworld Expo special. *Offer expires 8/31/93.*

Quick30 Accelerator + FPU Novy Systems (904/427-2358) is bundling its $269-to-$499 accelerator boards for the Macintosh SE, Plus, and Classic in speeds of 16MHz, 25MHz, and 33MHz (Jun 93 Editors' Choice) with a $49, $59, or $89 math coprocessor (price depends on board speed). *Exclusive* Macworld *offer expires 10/15/93.*

Spyglass Dicer 2.0 + Transform 3.0 + Format 1.1 Spyglass (217/355-6000) is bundling three scientific-visualization tools—its $695 Dicer, $595 Transform visual-data-analysis package, and $235 Format presentation manager (Jul 93 ★★★★ review—"the best available for their respective tasks")—with its $39.95 Data Handbook for $499. *Offer expires 9/30/93.*

COMPETITIVE UPGRADES

ClickChange 2.0 Dubl-Click Software (818/888-2068) is offering this $89.95 desktop customizer (Aug 93 ★★★★ review—"the uncontested king of customizing the Mac's interface") to users of Wallpaper, Chameleon, and Now Fun for $39.95. *Exclusive* Macworld *offer expires 1/31/94.*

DiskFit Pro 1.1 Dantz Development (800/225-4880) is offering this $125 backup utility (Apr 92 ★★★ review for version 1.0—"makes backing up easy") to users of any other backup program, for $29.95. *Exclusive* Macworld *offer expires 12/31/93.*

DISCOUNTS/REBATES/TRIALS

Alki Seek 2.2 Alki Software (206/286-2600) is offering this $39.95 file-finding utility (Jul 93 ★★★ review for version 2.1—"a competent file-finder") for $19.95. *Exclusive* Macworld *offer expires 12/31/93.*

DeltaGraph Professional 2.0 DeltaPoint. (800/446-6955) is offering this $295 charting and graphing package (May 92 ★★★★ review—"the best general-purpose business and technical charting program available"; 1992 World-Class award) for $89.95 (includes free upgrade to version 3.0). *Offer expires 9/30/93.*

Easy Alarms 2.1 Nisus Software (800/432-1287) is offering this $49 calendar program (Nov 92 ★★★ review for version 2.0.3—"plenty of nice features") for $29.95. *Offer expires 10/31/93.*

EndNote Plus 1.3; EndLink 1.1. Niles & Associates (510/649-8176) is offering End Note Plus, a $249 program that builds bibliographies automatically in all major word processors (Sep 92 ★★★★ review for version 1.2—"worth its weight in gold"), for $124.50. Also, its $99 EndLink, which allows EndNote Plus to read certain database and CD-ROM references, is offered for $49.50. *Exclusive* Macworld *offers expire 12/31/93.*

Fair Witness 1.2.1 Chena Software is offering a $25 rebate (upon receipt of registration card and dated sales invoice) on the selling price of this $295 full-service information manager (Oct 92 ★★★★ review for version 1.1—"a valuable tool for planning any project") when purchased through MacConnection (800/800-2222), Mac's Place (800/881-3090), MacWarehouse (800/255-6227), Mac Zone (800/248-0800), or ComputerWare (800/326-0092), after 7/31/93. *Exclusive* Macworld *offer expires 9/30/93.*

Final Draft 2.0 MacToolkit is offering this $349 script-writing program (Apr 93 ★★★★ review—"well conceived and easily customized") through Dr. Mac (800/825-6227) and Mac's Place (800/881-3090). Anticipated price: $249 to $269 (regularly $299 to $349). *Exclusive* Macworld *offer expires 9/30/93.*

Managing Your Money 5.0 MECA Software (203/256-5000) is offering a free 30-day trial (plus $8.50 for shipping and handling) of this $79.95 financial-management program (Jan 93 ★★★★ review—"full featured," "excellent price"). Trial users can then purchase it for $29.95 (regularly $34 to $39). *Offer expires 12/31/93.*

Mathcad 3.1 MathSoft (617/577-1017) is offering this $495 general-purpose calculation tool (Jun 93 ★★★ review—"easy to learn and easy to use") for $79.99. *Offer expires 10/31/93.*

MathType 3.0 Design Science (310/433-0685, 800/827-0685) is offering this $199 equation-writing program (Mar 93 ★★★★ review—"you wouldn't regret buying") as an upgrade to owners of Word 5.0 (which contains a miniversion of MathType) for $49. *Exclusive* Macworld *offer expires 9/30/93.*

NetWorks 3.0 Unlimited Caravelle Networks is offering this $995 network-monitoring software for AppleTalk, TCP/IP, Novell IPX, DECnet, and SNMP (Jun 92 ★★★★★ review for NetWorks 1.0.1—"worth its weight in gold") for $699 to users and dealers, only through authorized reseller TeamNet Technologies (800/379-6429; fax 415/474-9075). *Exclusive* Macworld *offer expires 10/31/93.*

Office Manager and Mail Manager 2.6 White Crow Software (802/658-1270) is offering this $149 combination of a contact/project manager (Dec 92 ★★★ review—for Office Manager 2.1–"simple but powerful") and a mail manager for $79. *Exclusive* Macworld *offer expires 12/31/93.*

Pixar OneTwentyEight Pixar is offering this $299 collection of 128 photographic textures on CD-ROM in TIFF format through MacWarehouse (800/255-6227) and Mac Zone (800/248-0800) for a special introductory $149.50. *Exclusive* Macworld *offer expires 10/31/93.*

PosterWorks 3.0 S.H. Pierce & Co. (617/338-2222) is offering a 10 percent rebate (upon receipt of registration card and dated sales invoice) on the selling price of this $395 large-format graphics production tool (Aug 93 ★★★★ review—"really has no competition") when purchased direct or through a reseller after 7/31/93. *Exclusive* Macworld *offer expires 9/30/93.*

SigmaPlot 4.11 Jandel Scientific (415/453-7769) is offering this $495 scientific grapher (Jul 92 ★★★ review—"a program every experimental scientist needs") for $199. *Exclusive* Macworld *offer expires 12/31/93.*

Thunder 7 1.5.3 Baseline Publishing (800/926-9677) is offering this $99.95 spelling checker and thesaurus (Jul 92 ★★★ review for version 1.0.5—"its speed, customization, and features are admirable") for $49.95. *Exclusive* Macworld *offer expires 10/31/93.*

ZP4 11.8 Semaphore Corp. (408/688-9200) is offering four quarterly editions of its ZP4 zip+4 code verification software on CD-ROM (May 92 ★★★★ review for version 7.0—"an invaluable complement to database or mailing-list software") for the price of three, or $375 instead of $500. *Exclusive* Macworld *offer expires 8/31/93.* m

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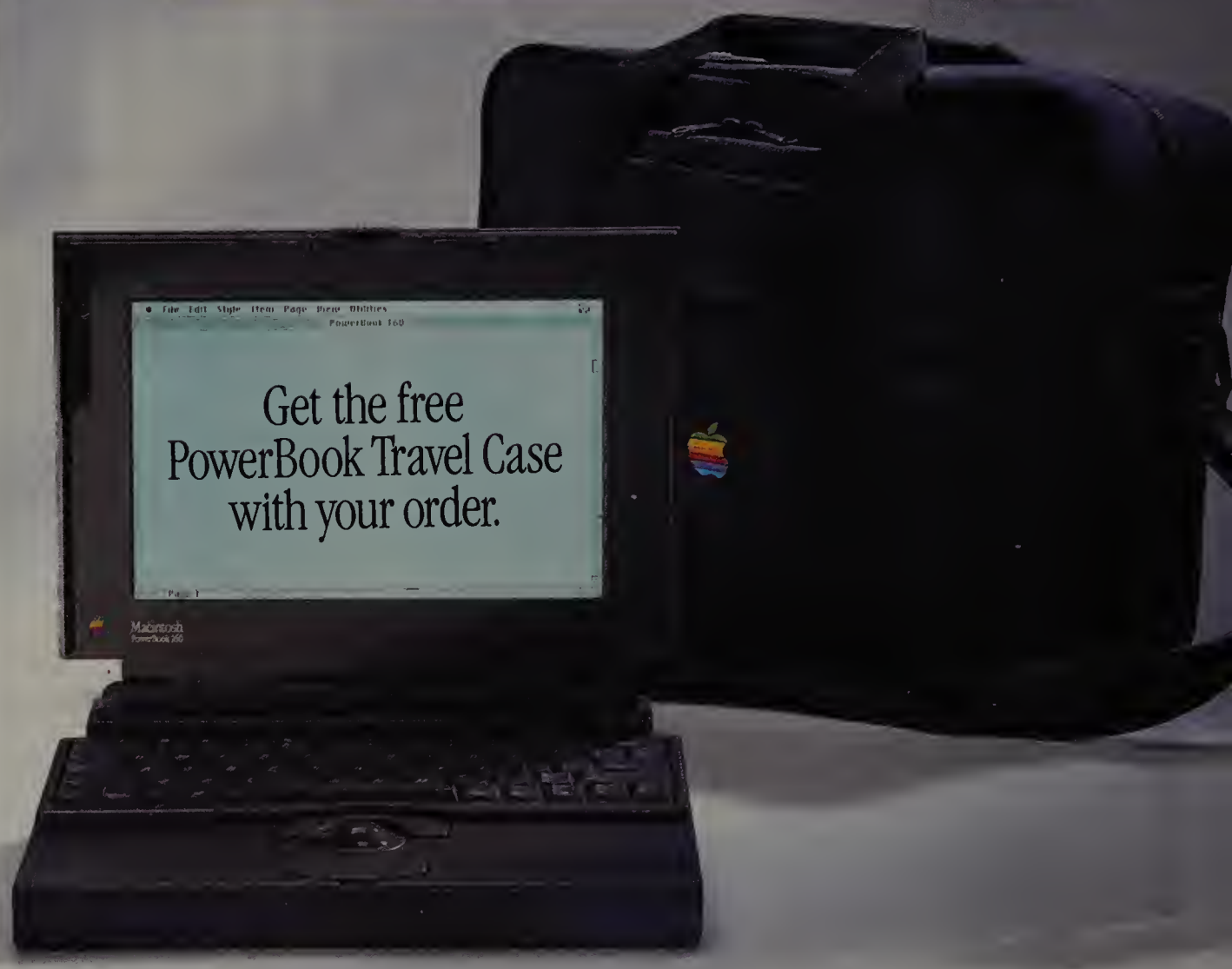

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66	Aldus	—	800/888-6293
219	Alliance Peripheral Systems	62	800/874-1429
213	Altsys	83	800/477-2131
207-208	America Online	—	—
10	Anthro	—	800/325-3841
29	Apple	—	
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26	ASD Software	170	909/624-2594
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218	Berkeley Systems	84	800/248-0800
179	Caere Corp.	69	800/535-SCAN
8	Canon USA	110	800/221-3333
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230	Central Point Software	24	800/289-9316
13	Chinon America, Inc.	64	800/441-0222
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32	Computer Associates	10	800/CALL-CAI
23	Contemporary Cybernetics Group	188	804/873-9000
90	Corel	78	800/836-3729
238	Dantz Development	26	510/849-0293
46	Data Desk	108	607/257-1000
273	Dataviz	79	800/733-0036
262	DataWatch	37	919/490-1277
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244	DCA	22	800/348-3221
40	Deneba Software	57	800/6CANVAS
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272	Digital Vision	23	800/346-0090
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Macworld

JUST FOR YOU. FREE PRODUCT INFORMATION FROM MACWORLD.

There's no cost or obligation. We even pay the postage! Simply fill in the questionnaire, then circle the numbers on the card below for the products that interest you. Numbers for advertised products can be found in the ad and in both the Product Index and Ad Index. Fold card and mail. No staples please.

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For faster results just fax this sheet to +1-413-637-4343. Please indicate your fax number where indicated.

Please answer these questions so that we may better serve you.

A. Including yourself, approximately how many people are employed at your entire work-site (i.e., employees in your office, building, or cluster of buildings)? (Check one.)

- 01 ❑ 1000+
- 02 ❑ 999 - 100
- 03 ❑ 99 - 25
- 04 ❑ Under 25

B. Which of the following computers are installed at this entire work-site? (Check all that apply.)

- 05 ❑ Apple Workgroup Servers/ Mac Quadra-series
- 06 ❑ Mac Centris-series/II-series/LC III/ Performa 600/450/SE 30
- 07 ❑ Mac LC/LC II/Performa 430/405/ 400/200/Classic-series/SE/Plus/ 512K/128K/Portable
- 08 ❑ Mac PowerBook-series/Duo-series

C. What is the total number of Macs installed at this entire work-site? (Check one.)

D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/ or services? (Check one.)

	C	D
500+	❑ 09	❑ 15
499 - 100	❑ 10	❑ 16
99 - 50	❑ 11	❑ 17
49 - 10	❑ 12	❑ 18
9 - 1	❑ 13	❑ 19
None	❑ 14	❑ 20

E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)

- 21 ❑ Initiate/Determine need for product/capabilities/features
- 22 ❑ Evaluate, recommend, or approve brands/models
- 23 ❑ Evaluate, recommend, or approve purchase source
- 24 ❑ Authorize purchases

F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)

- 25 ❑ $1 million or more
- 26 ❑ $999,999 – $500,000
- 27 ❑ $499,999 – $100,000
- 28 ❑ $99,999 – $50,000
- 29 ❑ $49,999 – $10,000
- 30 ❑ Under $10,000

G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)

- 31 ❑ Business software (Word processing, spreadsheet, database, etc.)
- 32 ❑ Graphics/publishing software
- 33 ❑ Monitors/displays
- 34 ❑ Printers/scanners
- 35 ❑ Networking/communications hardware and/or software
- 36 ❑ Multimedia/AV hardware and/or software
- 37 ❑ Mobile computing products (PowerBooks, peripherals, software, etc.)

H. What is your primary job function? (Check one.)

- 38 ❑ Computer Reseller/VAR/VAD
- 39 ❑ MIS/DP/IS/Network Management
- 40 ❑ Engineering
- 41 ❑ R&D/Scientific
- 42 ❑ Corporate/General Management
- 43 ❑ Accounting/Finance
- 44 ❑ Marketing/Sales/PR/ Communications
- 45 ❑ Art/Design/Creative Services

Thank You!

Please print or type all information.

Title _____

Co. _____

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Free Product Information

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304-305	Club Mac	96	800/258-2622
293	DGR Technologies	65	800/235-9748
320	Direct Connections	121	800/572-4305
282	Diskette Connection	30	800/654-4058
308	Dr. Mac	177	800/825-6227
319	Educational Resources	28	800/624-2926
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317	MacDirect	58	800/621-8467
283-292	MacMall	131	800/222-2808
318	MacNews	172	800/243-9383
309-312	Mac's Place	–	800/249-0009
314-315	MacProducts USA	175	800/MACUSA1
313	Super Micro	126	800/352-3415
301	Tiger Software	114	800/666-2562

Mail Order Sales Staff

Marsha Bowers	Acct Mgr	415/974-7413
Wendi A. Smith	Acct Mgr	415/978-3117

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323	ARS Nova	800/445-4866
NETWORKING		
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325	Delphi	800/695-4005
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323	Teletypesetting	800/835-2752
ACCESSORIES		
ACCESSORIES		
325	Jacmoor Int'l, Inc	800/267-4802
PRINTER REFILLS		
325	DGR Technologies	800/235-9748

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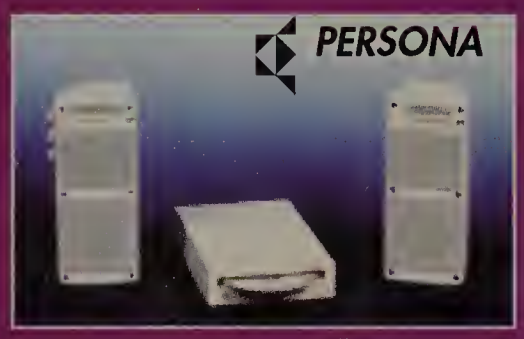

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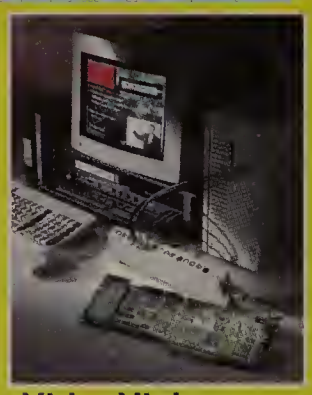

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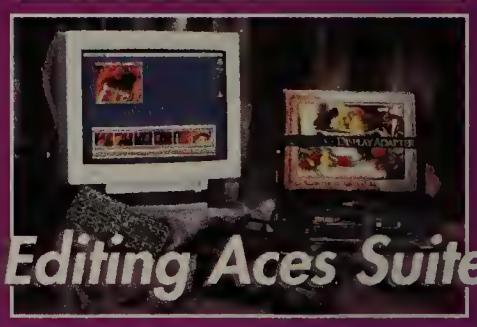

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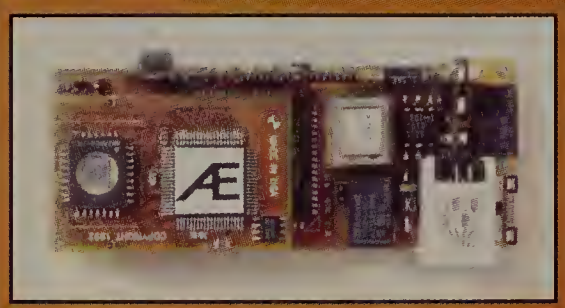

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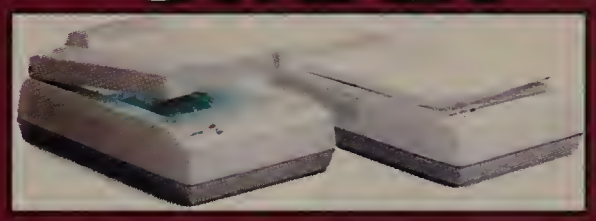

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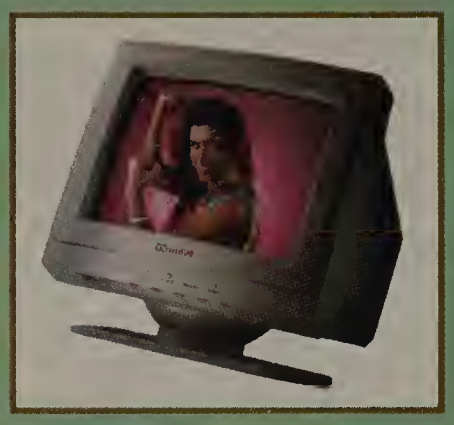

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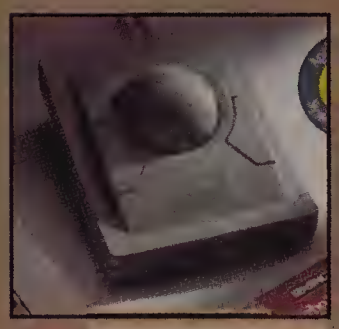

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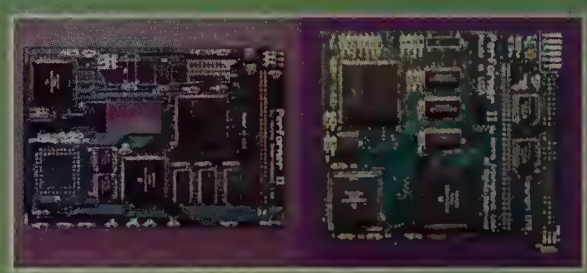

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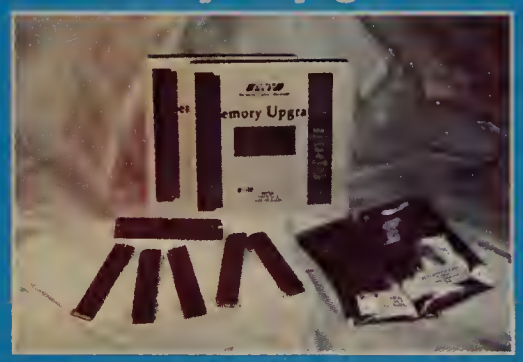

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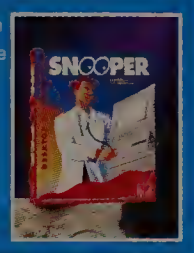

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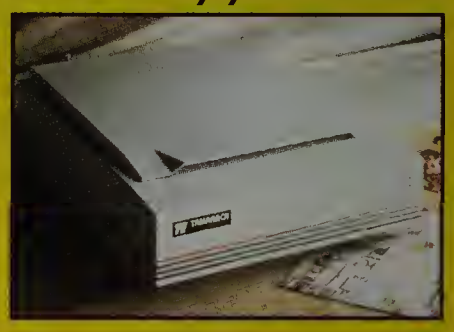

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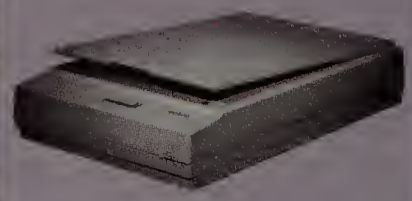

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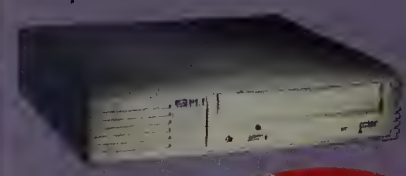

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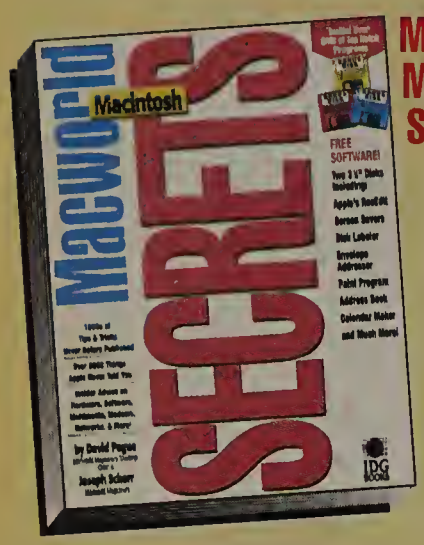

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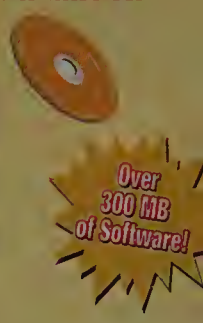

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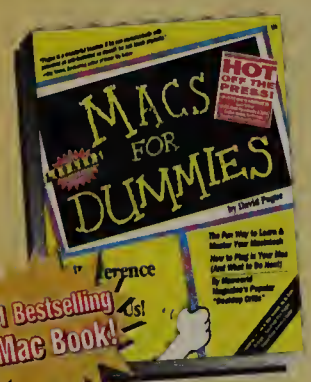

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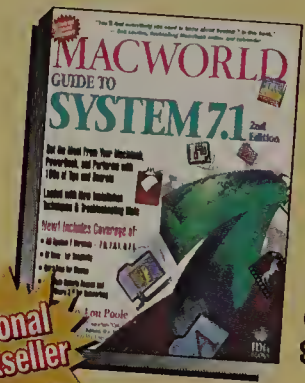

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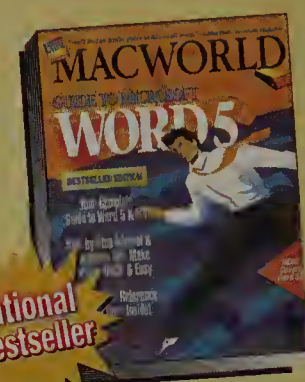

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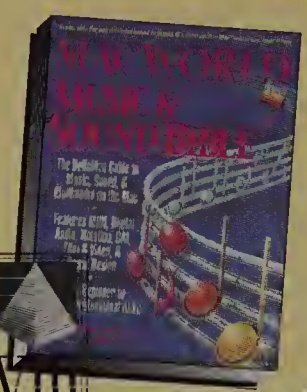

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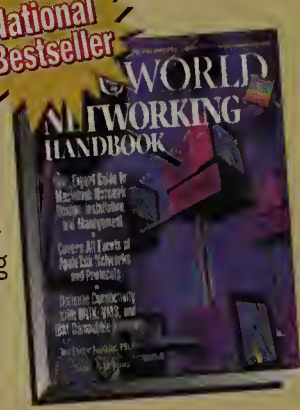

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LIFETIME WARRANTY

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1 MB, 80ns $37
10 MB PowerBook 160/180 ..... $439

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1012 Intelligent 10BT Hub $799
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Accelerators
DayStar 50 MHz PowerCache $689/799
DayStar Turbo '040 25 MHz $1049
DayStar Turbo '040i 25 MHz $679
Newer Quadra Overdrive $259
DiiMOCache 50 MHz ..... CALL

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US Robotics Sportster 14.4/14.4 ..... $249
Supra Fax Modem 14.4/14.4 ..... $299
Supra PowerBook Modem 14.4/14.4 ..... $299
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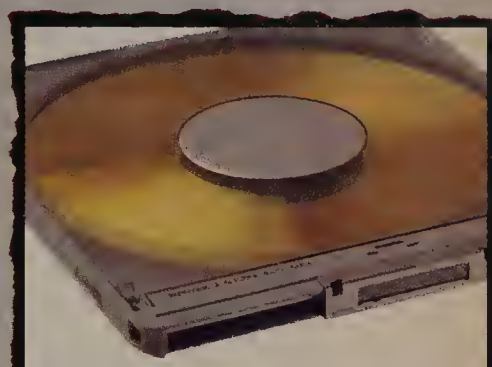
Global Village PowerPort Silver $339
Global Village PowerPort Gold $399

Monitors
NEC 3 FGe $599
NEC 5 FG $1299
E Machines T16 II $1295
SuperMac Thunder/24 ..... $2159



CD ROMs
Toshiba XM3401 ..... $599
NEC MultiSpin 74-1 ..... $549
Apple CD300 w/9 CDs $399

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All MacCenter® storage products include FWB Hard Disk Toolkit PE, double shielded SCSI cables & ext. terminator.

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Eagle™ SyQuest Drives
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Eagle 88 ..... $489
Eagle 88c $589
Eagle 105 ..... $689

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Falcon™ Hard Drives
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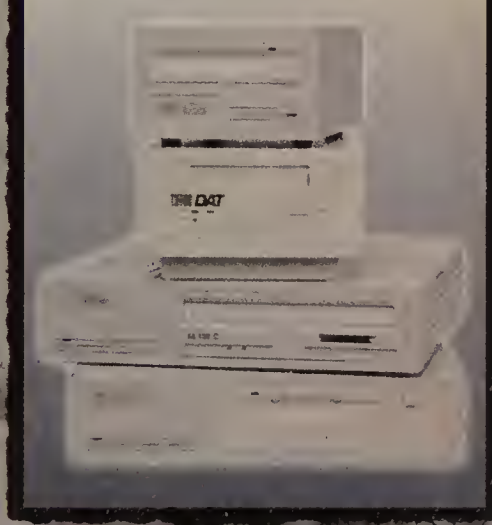
Fujitsu 1.2 GB $1199/1299
Toshiba 1.4 GB $1099/1199
Quantum GO-120 ..... $329/429
Quantum GO-160 ..... $479/579
Toshiba 213 (PowerBook) $599/699

We stock all Micropolis, Fujitsu, & Toshiba drives.



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APS HARD DRIVES

Model	Internal	External
85MB - 245MB		
APS Q 85 ELS[2] Quantum 85ELS mechanism	$159	$229
APS Q 127[2] Quantum 127ELS mechanism	219	289
MW APS Q 170[2] Quantum 170 ELS mechanism	239	309
APS MX 245[2] Maxtor 7245 mechanism	329	399
APS Q 245[2] Quantum LP240 mechanism	329	399

Model	Internal	External
345MB - 540MB		
APS MX 345[2] Maxtor 7345 mechanism	$499	$569
MW APS F 520[5] Fujitsu M2624S mechanism	759	829
APS Q 525[2] Quantum Lps525 mechanism	699	769
APS MX 540[2] Maxtor MXT540 mechanism	899	969

Model	Internal	External
1.2G - 3.0G		
Mac User LABS APS MS 1.2G[5] Micropolis 2112 mechanism	$1299	$1369
APS Q 1225[5] Quantum 1225P mechanism	1149	1219
APS MX 1240[3] Maxtor MXT1240S mechanism	1499	1569
APS MS 2.4G[5] Micropolis 1924 mechanism	2599	2699
APS MS 3.0G[5] Micropolis 1936 mechanism	2999	3099

1-5 *Denotes length of manufacturer's warranty*

• **30-day money-back guarantee** • All drive products carry a 30-day money-back guarantee. Your risk in the transaction is the cost of shipping.
• **Disk-for-disk replacement warranty** • SyQuest, most Quantum, Maxtor and DAT drives are warranted for two years, Maxtor 1.2, 1.7GB and Fujitsu drives are warranted for five years. WREN, Quantum 2.5" drives, TEAC drives, all CD-ROMs, MOs and SyQuest carts are warranted for one year. Toshiba 830 is warranted for three years.
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•**All our hard drives include brackets, cables, cords and LEDs required for operation** with the specified Macintosh. All hard drives from APS Technologies come preformatted with Apple's System 7.0.1 software, at least 9.2MB of compacted publicly-distributable software, and APS Technologies' ALLIANCE POWER TOOLS SCSI formatter/hard disk partitioner.
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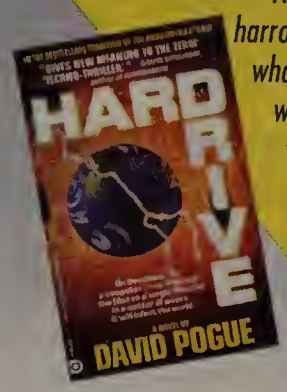

SYQUEST

Model	MB	External
APS SQ555	44MB	$379
44MB cartridges — $65		
APS SQ5110c	44/88	549
The SyQuest 5110c reads & writes 44 & 88MB cartridges! 88MB cartridges — $100		
APS SQ3105	105MB	689
105MB cartridges — $79		

NEW

The new APS SQ-3105 packs a whopping 105MB of storage in a small, light 3.5" cartridge that's only a little larger than a floppy disk. The compact drive unit weighs in at 3.7 lbs, and measures just 7.25" x 3.1" x 4.6". Delivering impressive sustained transfer rates as high as 1.2-1.4MB per second and seek times as low as 12ms, this is one option you really should consider if you need transportable storage that delivers the performance of a hard drive.

APS SQ 3105
$689

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POWERBOOK ACCESSORIES

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14,400 baud v.32 bis	299

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APS SCSI BOY 29

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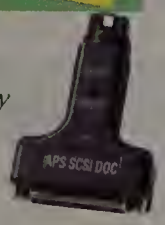

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- *SCSI Docking Adapter for Apple PowerBook*
- *Termination Power Indicator*
- *Dealer Inquiries Welcome*

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MW Editors' Choice

Model	Internal	AC/DC Case
APS 80GRS[1]	$199	$329
APS 120[1]	299	429
APS 160GRS[1]	399	529
APS T 213[1] Toshiba 2224 mechanism	499	629
APS T 340[1] Toshiba 2326 mechanism	799	929

MAGNETO OPTICAL

Model	Internal*	External
APS 128MBMO	$969	$999

Mechanism is Epson Magneto-Optical OMD-5010
128MB MO cartridges — $49

*128MB Magneto Optical Drive * Internal models for Quadra 900 and 950*

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DAT

Mac User Labs ★★★★

Model	Internal*	External
APS TurboDAT	$1299	$1399

**Internal models for Quadra 900 & 950*
All APS DAT Drives Include Retrospect by Dantz

TAPE DRIVES

APS 155 MB Tape Back Up	$499
APS 600 MB Tape Back Up	699

All APS Tape Drives Include Retrospect by Dantz

CD ROM

Mode	External	Special*
APS T 3401	$599	$689

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Accelerators

DAYSTAR DIGITAL

Model	Without FPU	with FPU
33 MHZ Powercache	$375	$465
40 MHZ Powercache	$545	$635
50 MHZ Powercache	$714	$845
Powercache Adapter		$40
Fast Cache Quadra 700, 900		$249
Fast Cache Quadra (all)		$375
33 MHZ Turbo 040		$1345
Fast Cache Turbo 33-128k		$179
Charger for Photoshop		$799

SyQuest

UnformattedCapacity Includes one free cartridge	Access Time (2 year Warranty)	Price
44 mb External	19 ms	$378
88C mb External	19 ms	$568
105 mb External	14.5 ms	$728

SALE

CD ROM

Airbourne's Texcel External CD-ROM Drive $448
265ms, Multisession, DualSpeed, SCSI-II

Toshiba 3401 Ext Drive $498
200ms, Multisession, DualSpeed, SCSI-II

NEC Intersect Ext Drive $169
625ms, Model CDR 25, Single Session, Single Speed, SCSI-I

Note: Bundles are only for sale with purchase of an Airbourne CD-ROM Drive

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- The New Grolier Multimedia Encyclopedia
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Clip Media & Fonts Bundle 69.00
- Font Fun House • Font Pro Vol. 1
- Publish It! 2.0 with Clip Art Fonts • Color it!

Modems

PROMETHEUS

All units come with MacFAX & MacKnowledge Software	Price
Ultima Home Office ext 14.4/14.4SR Fax w/ V.42 bis & voice	$378
Promodem 144i Internal for Powerbook 14.4/14.4SR Fax w/ V.42 & V.42 bis	$258
Promodem 144e ext 14.4/14.4 SR Fax w/ V.42 & V.42 bis	$248
Promodem 24e ext 24/96SR Fax w/ V.42 & V.42 bis	$128
Promodem Mini 2400 2400 BPS mini, data only	$79

SALE

ZOOM TELEPHONICS

All units come with Microphone LT & STF FAX Software	Price
Faxmodem PBK for Internal Powerbook 96/48 SR Fax w/2400 BPS Modem	$99
Faxmodem PKT Portable 96/48 SR Fax w/2400 BPS Modem	$109
Faxmodem FXV V42 bis/MNP5/2400 BPS, 96/96 SR Fax	$129
Faxmodem VFX V.32 V.32 bis, 14.4 data & fax, V.42 bis/MNPS	$258

Scanners

UMAX All Scanners includes free software

Model	Price
UC630 - Color w/free Photoshop v2.5	$1078
UC1260s - Color w/free Photoshop v2.5	$1848
UC840 - Color w/free Photoshop v2.5	$1248
Transparency Unit	$698
Auto Document feeder	$398
UG630 - Greyscale w/free Typereader OCR, OFOTO & Publish It	$848

SALE

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Includes one free disc (1 year Warranty)

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128 mb Epson Optical	29 ms	$988
128 mb Fujitsu Optical	34 ms	$998
256 mb Most Optical	31 ms	$1598

SALE

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WangTek 2.1 Gig DAT	$998	$1198
WangDat 5.0 Gig DAT	$1298	$1498

Memory

Model	60 NS	70 NS	80 NS	Model	60 NS	70 NS	80 NS
1x8	Call	$37	Call	2x8	Call	$66	Call
4x8	Call	$137	Call	16x8	Call	$579	Call

We carry most Mac Memory, Please Call for prices!

Memory for LCIII, Centris 610, 650

4mb $139	8mb $279	16mb $599

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CONNER

Unformatted Capacity	Access Time	Internal	External
3.5" Disk Drives (2 year Warranty)			
85 mb LPS	17 ms	$178	$238
170 mb LPS	12 ms	$248	$298
212 mb LPS	9 ms	$318	$378
540 mb	8.5 ms	$848	$898

QUANTUM

ELS Series (3.5" Low Profile and Low Power Drives)			
85 mb	17 ms	$178	$248
127 mb	17 ms	$198	$268
170 mb	17 ms	$208	$288
LPS Series (3.5" Low Profile and Low Power Drives)			
240 mb	10 ms	$298	$378
525 mb	10 ms	$699	$769
Prodrive Series (3.5" Half Height Drives)			
1.0 Gig	10 ms	$1048	$1109
1.2 Gig	10 ms	$1198	$1269
GO•Drive 2.5" Hard Drive (All Quantums - 2 year Warranty)			
160 mb	17 ms	$499	$599

TOSHIBA

3.5" & 2.5" Disk Drives (2 year Warranty)			
2.5" 213 mb	12 ms	$548	$648
3.5" 830 mb	12 ms	$1029	$1089
3.5" 1.2 Gig	12 ms	$1298	$1348

FUJITSU

3.5" & 5.25" Disk Drives (5 year Warranty, 3 year on 105mb)			
3.5" 105 mb	9 ms	$178	$228
3.5" 520 mb	9 ms	$738	$798
3.5" 1.1 Gig	8.5 ms	$1178	$1278
5.25" 2.06 Gig	11.5 ms	$2098	$2198
5.25" 2.4 Gig	11.5 ms	$2248	$2348

SEAGATE

3.5" Half Height Drives (1 and 5 year Warranties)			
1.2 Gig	10.5 ms	$1029	$1089
Wren and Elite Series (5.25" Full Height Drives)			
Wren 8 1.6 Gig	15 ms	$1279	$1379
Wren 9 2.1 Gig	12.5 ms	$1629	$1729
Elite 1 1.6 Gig	11.5 ms	$1699	$1799
Elite 2 2.4 Gig	11 ms	$2199	$2299
Elite 3 3.4 Gig	11 ms	$2799	$2899

Media

Model	1	5PK	10PK	Model	1	5PK	10Pk
SyQ44 cart	$65	$63	$61	128mb OPT	$37	$35	$33
SyQ 88 cart	$104	$101	$99	256mb OPT	$79	$76	$73
SyQ 105 cart	$78	$75	$71	90mm DAT	$19	$17	$14

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TIGER MEMORY

EDITOR'S NOTE: *Here at Tiger we love our Mac computers, but we kept getting "The application could not be opened" and "Application has unexpectedly quit" messages. We found out that the amount of memory they came with from Apple just wasn't enough for the newer applications. So we called our Apple Dealer and priced out more memory. Wow! We were in shock! $995 for 4MB of memory! We knew something wasn't right, so we set out to find a better way.*

MACINTOSH MEMORY CHART

Your Computer	Comes With	Upgrade To	Price	Order This Kit
Plus & SE	1MB	2.5MB 4MB	$79.00 $169.00	A D
Classic II & LC	2MB	4MB 6MB 10MB	$79.00 $159.00 $299.00	A B C
LC II & Performa 400	4MB	6MB 8MB 10MB	$79.00 $159.00 $299.00	A B C
IIsi	1MB	5MB 9MB 17MB	$169.00 $299.00 $599.00	D E F
II, IIx, IIci & IIcx	1MB	5MB 9MB 12MB 17MB	$169.00 $299.00 $468.00 $599.00	D E D+E F
IIfx	4MB	8MB 20MB 32MB	$149.00 $599.00 $1198.00	M N (2) N
Performa 200	4MB	6MB 10MB	$159.00 $299.00	B C
IIvx, IIvi & Performa 600	4MB	8MB 12MB 20MB	$169.00 $299.00 $599.00	D E F
LCIII, Centris 610 & 650 ColorClassic	4MB	12MB 20MB 36MB	$338.00 $678.00 $1398.00	(2) G* (2) H* (2) I*
Quadra 800	8MB	16MB 24MB 40MB 72MB	$338.00 $678.00 $1398.00 $2796.00	(2) G* (2) H* (2) I* (4) I*
Quadra 700 & 900	4MB	8MB 12MB 20MB 36MB	$169.00 $299.00 $599.00 $1198.00	D E F (2) F
Quadra 950	8MB	12MB 16MB 24MB 40MB	$169.00 $299.00 $599.00 $1198.00	D E F (2) F

**The Centris Line and Quadra 800 require 72-pin SIMMs.*

Get the SIMM Remover Tool from Stratos Innovations and the Macintosh Memory Guide Book and Diskette from Connectix with any memory order!

The handy anti-static SIMM Remover Tool makes memory upgrading simple and straightforward. SIMMs can be difficult to replace and the process can damage circuit boards and connectors. This free gift safely extracts SIMMs from all connector types and virtually eliminates potential computer damage. *Limit one per order.*

The Macintosh Memory Guide gives a simple explanation of memory and how to get the most out of your Mac. Packed with tips on making your Mac faster, the mysteries of 32-bit addressing and much more.

TIGER MACINTOSH MEMORY

Part #	Kit	Description	Price
C01-222A	A	(2) 1MB SIMMs, 80 nanoseconds	$79.00
C01-222B	B	(2) 2MB SIMMs, 80 ns	$159.00
C01-222C	C	(2) 4MB SIMMs, 80 ns	$299.00
C01-222D	D	(4) 1MB SIMMs, 80 ns	$169.00
C01-222E	E	(4) 2MB SIMMs, 80 ns	$299.00
C01-222F	F	(4) 4MB SIMMs, 80 ns	$599.00
C01-222G	G	(4) 16MB SIMMs, 60 ns	$2399.00
C01-222H	H	(4) 1MB SIMMs, 60 ns	$149.00
C01-222I	I	(4) 4MB SIMMs, 60 ns	$599.00
C01-223A		1MB SIMMs, 80 ns	$42.00
C01-223B		2MB SIMMs, 80 ns	$76.00
C01-223C		4MB SIMMs, 80 ns	$156.00
C01-223F		512K Video RAM SIMM	$78.00
C01-223G*		4MB SIMMs, 72-pin 60 ns	$169.00
C01-223H*		8MB SIMMs, 72-pin 60 ns	$339.00
C01-223I*		16MB SIMMs, 72-pin 60 ns	$699.00

Other configurations are available. For more information or fast assistance in determining your needs, please call our Memory Specialists. Due to new Federal tariffs imposed on SIMMs, prices may vary significantly. Please call for latest prices and availability.

Interactive Spell-Checker, Thesaurus, And Shorthand Glossary!

Thunder 7 is the single-source reference program for any writing assignment. Its premier spelling and word use utility are compatible with any Mac application or Desk Accessory. Correct Your Spelling INTERACTIVELY, as you type. Thunder 7 alerts you when a mistake is made, and instantly offers suggestions. Or switch to traditional spell-checking and check an entire article at once.

Check punctuation and capitalization, create your own custom dictionary and more. Enlarge your vocabulary with Thunder 7's massive thesaurus – over 1.4 million synonyms, antonyms, compared and related words. You'll accelerate your typing and avoid costly typos with Thunder 7's remarkable Shorthand Glossary. It enables you to abbreviate commonly used phrases – Thunder 7 types out the entire phrase for you! It even corrects some typographical errors by itself!

Finally, Thunder 7's Ghostwriter records all of your keystrokes to disk – protecting it against equipment failure.

BGS1111 **Thunder 7** $54.90

Make Movies Of Everything You Do On Your Mac!

Spectator is the easy-to-use screen recording utility that lets you edit audio and video right on your screen. Produce great training materials, software demos and presentations. Record every move you make, what menus and tools to use and how to operate them for maximum productivity. Make self-running movies on how to send a package via Federal Express, how to accept an item of merchandise for return or how to shutdown a network.

Add titles, video clips, audio track and animated sequences to your movies and save them as self-running applications; distribute them to others. Get creative – cut and paste pieces together, add frames, and throw in some well-timed sound effects.

Spectator, incidentally, gives you high-quality sound capabilities, unlike anything we've ever seen in other screen recording packages.

BGS1112 **Spectator** $84.90

The Advanced Screen Graphics Solution!

Exposure Pro is an extremely powerful and versatile screen capture and paint program which works in black and white, grayscale and full-color – including 32-bit. It's filled with a variety of convenient features including: printing directly from within Exposure Pro, saving images in most popular file formats, and editing captured screens. Because of Exposure Pro's approach to capturing, it's available within any program and is capable of capturing almost any image you can display on your Macintosh screen.

What is a screen capture program? A screen capture program is designed to let you take a "picture" of whatever appears on your screen. Most Macs are capable of a simple version of screen capturing. When you use Exposure Pro, however, you have a wealth of tools and commands at your disposal for modifying, printing, and saving your captured screens. This includes a full-featured painting program. So why settle for a boring, one-shot, uneditable screen capture? Let your imagination run wild with Exposure Pro.

BGS1113 **Exposure Pro** $74.90

The Best Flatbed Scanner In The Business!

Scan your brains out with four high-powered scanners. Scanned images look just like the originals. Built to stand up to the punishment of constant use, the new ScanOffice grayscale scanner is the ultimate office scanning solution. The 600 dpi color scanner is the perfect first scanner for Mac users wanting crisp, rich color. The 800 and 1200 dpi color scanners are the choice of professionals who demand the last word in ultra-sharp focus, exacting color and consistent performance. All UMAX scanners feature the best flatbed design and are crafted with extraordinary optics – with onboard self-alignment, pin-point precision and single-light accuracy. New software interpolation doubles the resolution – and it's free with every scanner!

The new ScanOffice is the one-stop solution for creating presentation materials, newsletters, brochures, flyers, invitations and more. ScanOffice produces an unbelievable 600 dpi resolution. Scan your text and images in 600 dpi and you'll be hopelessly addicted to the rich tones, crisp detail and ultra-sharp focus. ScanOffice was designed around the concept that any office can do it all in-house – for an extraordinary low price. All you need is Scan-Office, a PC and a printer. This 256-grayscale, full-size, precision scanner can even be upgraded in the future to full color capability.

The impressive collection of award-winning software bundled with ScanOffice comes complete with every imaginable tool needed to do it all: **Publish It! Easy**™ – a full-featured desktop publishing program, **Ofoto**® – one-step image scanning software, and **TypeReader® OCR 1.01** – OCR software that converts virtually any printed material.

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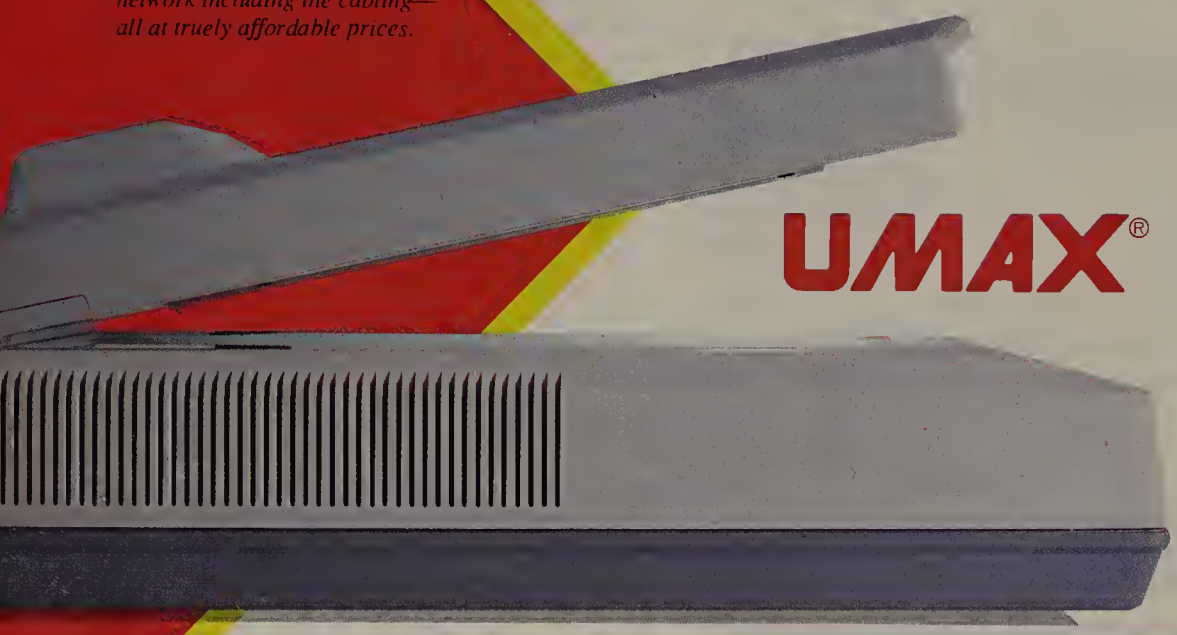

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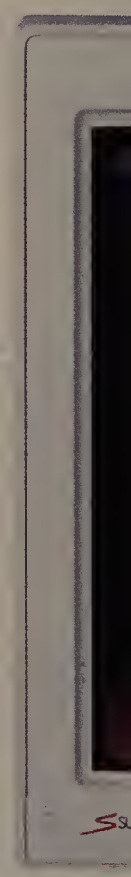

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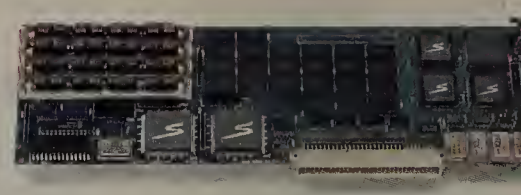

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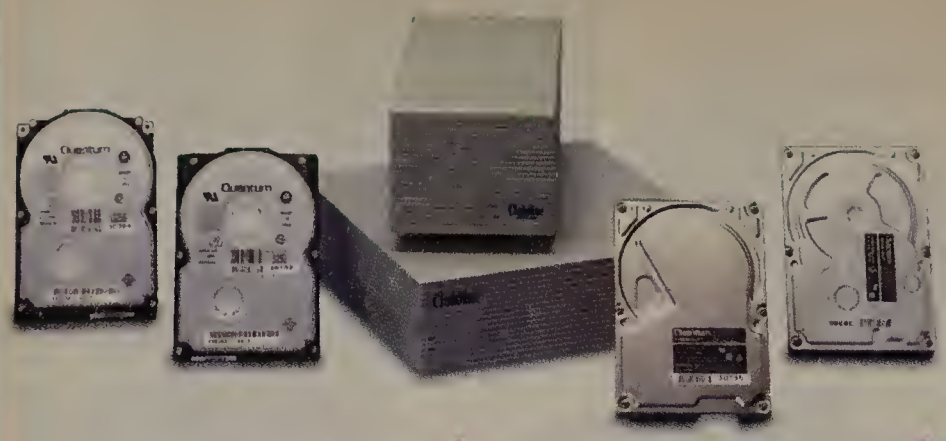

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240mb	7245S	3.5" Low Profile	15ms	235mb	$279	$339
345mb	7345S	3.5" Low Profile	12ms	327mb	$399	$459
540mb	MXT-540	3.5" Half Height	8.5ms	521mb	$899	$959
1240mb	MXT-1240	3.5" Half Height	8.5ms	1150mb	$1289	$1349

Seagate

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2.4GIG	ST12400N		9ms	2000mb	$2129	$2289
2.4GIG	ST12550N	Barracuda	8ms	2050mb	$2399	$2459
5.25" FULL HEIGHT						
1.6GIG	ST41651N	Wren-8	15ms	1350mb	$1279	$1379
2.1GIG	ST42100N	Wren-9	12.9ms	1900mb	$1549	$1649
1.6GIG	ST41600N	Elite-1	11.5ms	1307mb	$1659	$1759
2.4GIG	ST42400N	Elite-2	11ms	2050mb	$2069	$2169
3.4GIG	ST43400N	Elite-3	11ms	2750mb	$2759	$2859

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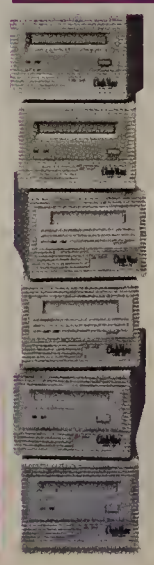

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3-5GIG	WangDAT 3200	DAT, DDS-DC	4mm	$1275	$1295
2.0GIG	HP 35470A	DAT, DDS	4mm	$1179	$1199
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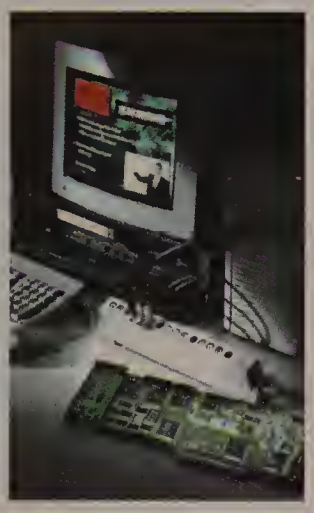

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4MB RAM 80MB Drive $2349	4MB RAM 120MB Drive $2579	4MB RAM 120MB Drive $3779	4MB RAM 120MB Drive $2949	4MB RAM 120MB Drive $1689	4MB RAM 120MB Drive $2499	4MB RAM 120MB Drive $1399	5MB RAM 80MB Drive CD-ROM $1589	8MB RAM 230MB Drive CD-ROM $2079	8MB RAM 230MB Drive CD-ROM $3369	8MB RAM 500MB Drive $4599	8MB RAM 520MB Drive $5199	32MB RAM 500MB Drive $9449

NEC SilentWriter 95F	RasterOps CorrectPrint	QMS 860 Hammerhead	HP DeskWriter	TI MicroLaser PS/35	GCC PLP II
$949	$7499	$3979	$359	$1199	$629

Infinity 40 Turbo $409
44MB external SyQuest removable cartridge drives

Infinity 88 RW44 External $619
88MB SyQuest drive reads and writes to 44MB cartridges

Infinity 105 External $789
105MB external SyQuest removable cartridge drive

Quick SCSI Card $279
SCSI-2 NuBus host adapter card with cable

MiniArray 2.0GB $3799
Fast $2.0GB fixed hard drive with QuickSCSI

Infinity Optical 5.25" 600MB $2499
Removable, rewritable optical cartridge drive

CD-ROM Drive $619
Multi-Session Photo CD Compatible Drive

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ArtZ Tablet $279
6 x 8 pressure-sensitive digitizing tablet

6 x 9 Standard Tablet $435
6 x 9 pressure-sensitive digitizing tablet

12 x 12 Electrostatic Tablet $695
12 x 12 pressure-sensitive digitizing tablet

12 x 18 Electrostatic Tablet $999
12 x 18 pressure-sensitive digitizing tablet

18 x 25 Standard Tablet $2495
18 x 25 pressure-sensitive digitizing tablet

Painter v 2.0 ..... $225
Special price with purchase of Wacom tablet

microLaser Plus PS17 ..... $1069
9 ppm, 300 dpi Laser Printer with 17 PostScript fonts

microLaser Plus PS35 ..... $1199
9 ppm, 300 dpi Laser Printer with 35 PostScript fonts

microLaser Turbo $1379
RISC-based Laser Printer with 35 PostScript fonts

microWriter PS23 ..... $859
5 ppm, 300 dpi Laser Printer with 17 PostScript fonts

microWriter PS65 ..... $1099
5 ppm, 300 dpi Laser Printer with 35 PostScript fonts

microLaser Memory $39
1MB RAM Upgrade for microLaser Plus

microLaser Toner $39
1MB RAM Upgrade for microLaser Plus

630Le Flatbed $879
Color flatbed scanner, 600 x 300 dpi

630 Flatbed $1039
Color flatbed scanner, 600 x 300 dpi, Photoshop

840 Flatbed $1249
Color flatbed scanner, 800 x 400 dpi, Photoshop

1260 Flatbed $1869
Color flatbed scanner, 1200 x 600 dpi, Photoshop

1200 Flatbed $2599
Color flatbed scanner, 1200 x 1200 dpi, Photoshop

Transparency Option $689
Transparency scan option upgrade for Umax flatbed

Scan Office $829
Grayscale flatbed scanner with OCR software package

Displays	
Apple 14" / 16" RGB Display	$515 / $1199
NEC MultiSync 4FGe / 5FGe	$749 / $1149
Sigma Designs Ergo View 17"	$1025
Sigma Designs Power Portrait	$515
Silverview 21"	$899
Ikegami CT-20	$1699
Printers	
Apple StyleWriter II	$329
Apple LaserWriter 300 / 310	$785 / $1025
Apple LaserWriter Pro 600	$1849
Apple LaserWriter Pro 630	$2375
Dataproducts LZR 960 / 1560	$1049 / $2799
Hewlett Packard LaserJet 4M	$1989
Scanners	
Apple OneScanner	$1269
Microtek Scanmaker le / IIxe	$835 / $1075
Hewlett Packard ScanJet IIc	$1399
Software	
Act! Contact Manager	$235
Adobe Illustrator v.3.2	$335
Alous Freehand v.3.1	$369
Canvas v.3.0	$249
Fractal Design Painter v.2.0	$249
Macromino Director v.3.1	$749
Minicad	$489
Norton Utilities Mac v.2.0	$85
Modems & Fax Modems	
DoveFax	$165
DoveFax Plus	$219
Supra v.32bis Modem	$239
Supra v.32bis Modem with Mac Pack	$269
Supra 14.4 PowerBook Modem	$239
Drives & Tapes	
Applied Engineering Plus Drive	$283
Bernoulli Pro 90MB with interface	$539
Fujitsu 520MB / 1.2GB	$725 / $1099
Magic CD-ROM	$569
Quantum 240MB / 525MB	$299 / $669
Toshiba 213MB PowerBook	$589

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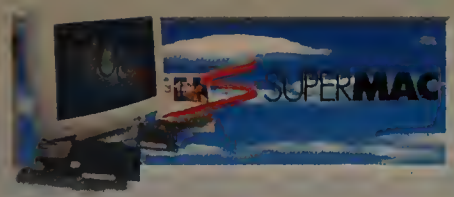

THUNDER II **$3399**
Accelerated QuickDraw & 24-bit color interface for Hi-Res 20

THUNDERSTORM PRO **$2699**
Graphics accelerator bundled with Thunder/24

SPECTRUM/24 SERIES IV **$795**
Accelerated 24-bit color interface lor 21" display

THUNDER/24 ..... **$2175**
Thunder/24 – Accelerated 24-bit color interface

SUPERMATCH HI-RES 20-T **$2699**
Two-page, 20-inch Trinitron high-resolution display

SUPERMATCH 20-TXL **$2499**
Two-page, 20-inch Trinitron multimode display

SUPERMATCH 20 ..... **$1469**
Two-page, 20-inch color display

SUPERMATCH 17-T **$1049**
Full-page, 17-inch Trinitron display

SPECTRUM/24 PDQ PLUS **$1459**
Accelerated 24-bit color interface for 21" display

PAINTBOARD LI **$769**
Accelerated 24-bit color interface for up to 20"" displays

24XLI **$1299**
Accelerated 24-bit upgraded color interface

24MXQ **$1135**
Accelerated 24-bit color interface for 21" with Quadra

24STV **$755**
Accelerated 24-bit color for 13", video display/capture

24XLTV **$2548**
Accelerated 24-bit color, video display/capture

PAINTBOARD TURBO **$1149**
24-bit accelerated color interface with pan & zoom

20/20 MULTISCAN DISPLAY **$1359**
Two-page, 20-inch multiscan color display

20" MULTI-SCAN TRINITRON **$2225**
Two-page, 20-inch Trinitron display

20" MULTIMODE HITACHI **$1299**
Two-page, 20-inch Hitachi display

COLOR PIVOT LE **$799**
Full-page color display portrait & landscape with interface

ROCKET 040 33 ..... **$1399**
33MHz 68040 accelerator

ROCKET SHARE **$389**
Allows multi-processing with one or more Radius Rocket

VIDEOVISION **$1849**
Color interface with video capture

PRECISION COLOR 24XP **$469**
Accelerated 24-bit interface for 16" displays

PRECISION COLOR 24X **$1449**
Accelerated 24-bit interface tor 21" display

INTELLICOLOR DISPLAY 20 ..... **$2499**
Two-page, intellicolor, 20-inch color display

PRECISION COLOR PIVOT **$899**
Full-page Multisync color display portrait & landscape

TWO-PAGE DISPLAY 21" **$775**
Two-page, 21-inch monochrome landscape display

25MHZ TURBO 040 ..... **$1025**
Accelerates CPU functions with 68040 supplement

33MHZ TURBO 040 ..... **$1275**
Accelerates CPU functions with 68040 supplement

FASTCACHE TURBO 33 ..... **$165**
128K cache for 33MHz Turbo 040

UNIVERSAL POWERCACHE
PowerCache Adapter Not Included. Add $39 for Adapter.

33MHZ POWERCACHE **$349**

33MHZ POWERCACHE WITH FPU **$425**

40MHZ POWERCACHE **$505**

40MHZ POWERCACHE WITH FPU **$575**

50MHZ POWERCACHE **$649**

50MHZ POWERCACHE WITH FPU **$779**

FASTCACHE QUADRA 128K **$365**
128K Static RAM cache for Quadra 700/900/950

ALDUS PAGEMAKER **$529**

MS EXCEL 4.0 **$289**

QUARK XPRESS **$499**

EFI COLOR PHOTOSHOP **$139**

PHOTOSHOP **$499**

FILEMAKER PRO **$244**

SYQUEST

44MB Cartridge	$59
88MB Cartridge	$89
105MB Cartridge	$99

GLOBAL VILLAGE

Powerport & Teleport Gold	$369
Powerport & Teleport Silver	$309
Powerport & Teleport Bronze	$169

E-MACHINES

T-16 II Display	$1229
Futura SX Interface	$469
PowerLink Presenter	$429

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OFOTO 2.0

Ofoto Version 2.0 sets a new standard for ease of use and accuracy when scanning line drawings, art, and images — color, grayscale, and black and white. High-fidelity scans with the click of one button. Out-of-focus or under and over-exposed problem originals are no longer a problem. Ofoto can even fix photographs that have been taken with the wrong film. Don't "correct" your scan; get it right the first time with Ofoto Version 2!
Item # LS11

UPDATE

FAXPRO II 14.4 V.2.2 HI-SPEED MULTIUSER

FaxPro II 14.4 is a complete hardware and software package which includes a 14,400 bps fax modem that works with all standard Group 3 fax machines. The new fax modem significantly increases transmission speed, saving time and money on phone bills. Also, FaxPro II 14.4 users can transmit to the more popular 9,600 bps fax machines. Item # CYP17

FaxPro II MultiUser Fax System 9600 V.2.2 Item # CYP12 **$648**
FaxPro II Software Only V.2.2 **$398**
Item # CYP18 (compatible with most fax modems)

NEW!!

TELECOUPLER II

The Road Warrior Telecoupler II connects your portable computer's modem to virtually any telephone—even cellular phones—delivering high speed FAX or data communication whenever and wherever you need it. It's fast—up to 14,100 bps and it eliminates the need for a "hard-wired" connection or the elusive RJ-11 modular phone jack. So whether you are at a hotel, pay telephone or at a customer site, the Telecoupler gives you the power to communicate the world over. International travel kits available. Item # CPP10

UPDATE

RAY DREAM DESIGNER 2.0

The best value in 3D! Ray Dream Designer "sets the standard for 3D illustration" according to Macworld. Don't settle for flat illustration — produce stunning full color photorealistic 3D art for one-third the price of the competition. Designer handles the details — lighting, shadows, transparencies, and reflections — so you spend your time being creative. Item # RAY10-80

HARDWARE

ArtZ	$298
MicroLaser Turbo PS35	$1448
MicroWriter PS23	$898
Procom CD Drive Multisession	$599
QMS 860 HammerHead	$3998
Radius Video Vision	$1898
SuperMatch 17T	$1048
SuperMatch 20T	$2448
200 MB Drive for Powerbook 12ms	$679

SOFTWARE

Adobe Photoshop 2.5	$529
Adobe Illustrator 3.2	$348
Aldus Freehand 3.1	$369
Aldus PageMaker 4.2A	$475
Animation Works	$112
Astound!	$98
FileMaker Pro 2.02	$265
Fractal Design Painter 2.0	$259
QuarkXPress 3.11	$529

POLICIES: Credit card is not charged until order is shipped. **Shipping:** $3 in Continental U.S.A.. UPS overnight guaranteed (subject to credit approval). *Hardware over 10 lbs actual or dimensional weight will be shipped ground. **Money Back Guarantees & Returns:** call for RA# before return. Retain original packaging. Restocking fee may apply. Low price guarantee good at time of purchase only.

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NEW!!

QUICKTOONS™

Now for the first time, enjoy cartoon classics in QuickTime™ on your Mac. These are public domain cartoons featuring Porky Pig, Daffy Duck, Betty Boop and Bimbo. Clips from any of these cartoons will work great for your multimedia presentations or, just sit back and enjoy them for pure entertainment.
Item # WZ34-89

MULTI-AD CREATOR 3.5.2

The Special-Purpose Tool that Automates Advertising Layout and Production

Multi-Ad Creator is a layout program whose main advantage is speed in laying out and filling ad spaces. Its extensive drawing tools allow you to create gradients, drop shadows, borders and objects such as star bursts. Multi-Ad Creator permits excellent type handling, precise control over kerning, leading, tracking, word spacing and spell checking. 3.5.2 has full-blown control over color. Item # MUL10-80

Multi-Ad Search® 2.0 Item # MUL11 **$108**
(10-pack available)

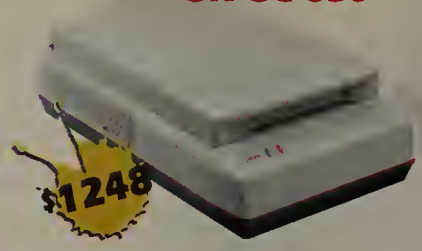
DOVEFAX+V EXTERNAL

The Fax, Data and VoiceMail for your Mac, All-in-One!

DoveFax+V turns your Macintosh into a fax machine, data modem and telephone answering system. Features include: send/receive faxes and data at up to 14.4 Kbps; answer your telephone with personalized announcements; review caller messages on your Mac or retrieve them remotely; manage your voice, fax and ARA calls on one telephone line; and 9600/2400 bps. Item # DVH70

DoveFax+V Internal Item # DVH71 **$215**

NEW LOW PRICE ON UC 630



UMAX UC 840

UMAX Color Scanners are number one in performance, reliability and value.
The 800 dpi high resolution scanner produces sharp images in a three pass, single lamp configuration with virtually no pixel offset. You get only vivid color registration. The UMAX UC 840 has many additional features, including multiple scanning modes, I/O buffer on board, fast/accurate data transfer, optional transparency adapter and auto document feeder. Item # UMAX14

UMAX UC 630 Item # UMAX10 **$958**

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NEW!

The Photoshop Wow! Book

This book uses step-by-step illustrations and clear practical guidelines to present the basic technical information that users need in order to use Adobe Photoshop effectively and profitably. The book is heavily illustrated throughout, with 16 pages of full-color illustrations created by top Photoshop artists. An included disk contains special effects filters, textures, and other program enhancements.
(#6548, Peachpit Press)

$438.

NEW!

VideoFusion 1.5

The award-winning special effects software for QuickTime post production is now faster and boasts new features. Field rendering support means smoother movement when output to videotape. A new NTSC-safe filter corrects colors for broadcast opportunity. And special effects processing tools (like pan-zoom-rotate, warp, and morph) are accelerated by up to 100 percent.
(#6672, VideoFusion)

Minimum requirements: Mac II, 5MB RAM, System 7.0., 80MB hard drive, and QuickTime.

$528.

Painter 2.0 & ArtZ Bundle

Create original art or apply fantastic effects to other artwork including scanned images with new Painter 2.0. New features include color separation, spatter airbrush, Cubist effect, and multiple light sources. Used with the ArtZ 6" x 8" tablet, the effects are astonishing. The latest from the premiere tablet maker, ArtZ's stylus is cordless, batteryless, and detects 120 levels of pressure.
(#5657/5355, Fractal Design/ Wacom Technology Corp.) ○

Minimum requirements: SE/30, 2.5MB RAM, System 6.0.5.

$99.

NEW!

Aldus SuperPaint 3.5

Aldus SuperPaint is the complete painting, drawing, and image-enhancement tool. It gives you the ability to create a wide range of graphics within a single environment. SuperPaint includes 1-, 8-, 16-, and 32-bit document capabilities. And you get an extensive gallery of colors, patterns, textures, gradients, and transfer modes, plus the freedom to create your own.
(#6493, Aldus) ○

Minimum requirements: Mac SE, 2MB RAM, System 6.0.5, a hard drive.

$1798.

NEW!

ArtiScan 12000C with Photoshop 2.5 Bundle

Scan art with remarkable accuracy. Tamarack ArtiScan gives you state-of-the-art resolution and impeccable color image quality. Art and technology unite in 1200 x 1200 dpi high-resolution, so your pictures, photos, and graphics are reproduced on-screen with spectacular accuracy. Photoshop 2.5 is included and a transparency option is available. Adobe Photoshop 2.5 is the world's leading photo design and production tool. Design and produce color and black-and-white images, right at your desk. Start from scratch or with any scanned image. Add or correct color, execute delicate retouching, import illustration files, create duotones, tritones, and quadtones, and more. Then produce it with professional controls for four-color-process proofing and separations.
(#6536, Tamarack Technologies)

Minimum requirements: SE, 2MB RAM, System 6.0.4, hard disk.

$88.* Action!

NEW!

$489. IOMEGA

NEW!

MacTransportable 90 Pro

Get Action! for $88 when you buy the MacTransportable 90 Pro. Action! makes it easy to create dazzling presentations that combine motion, sound, text, graphics, animations, and QuickTime movies. The built-in ClipMedia library of graphics, sounds, and animations gives your presentation a professional look and sound in an instant. (#6532, MacroMedia) The Bernoulli MacTransportable 90 PRO is designed especially for the Mac, at a low price. This external, removable-disk drive comes complete with a 90MB cartridge and installs easily without an interface kit. You'll enjoy unlimited storage expandability, lock-away security, and transportability. As with all Bernoullis, the patented design resists head crash. And the sturdy disks can survive a drop of eight feet!
(#5012, IOMEGA) ○

** Must purchase MacTransportable 90 Pro or Multidisk 150.*

Minimum requirements: Mac Plus, System 6.0, 2MB RAM and System 6.0.2 for Action!

$789. MacTransportable MultiDisk 150 (#5609)

$184.

Save $10.

DeBabelizer

This graphics processing toolbox will save you time, effort, and money. It translates from and to over 50 bit-mapped graphic file and animation formats for Mac, DOS, Windows, Silicon Graphics, Sun Microsystems, Amiga, and others. You can even edit images without the creating software. Batch processing and internal scripting functions save time by automating repetitive manipulation and editing tasks. Create QuickTime blue-screen effects with background removal features. DeBabelizer will also report and display differences between original and revised images. Jack Eastman, VP Engineering of Berkeley Systems (makers of After Dark) says, "DeBabelizer has the best cross platform graphics translation for serious graphics production. We couldn't produce our graphics without it."
(#6193, Equilibrium)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.7.

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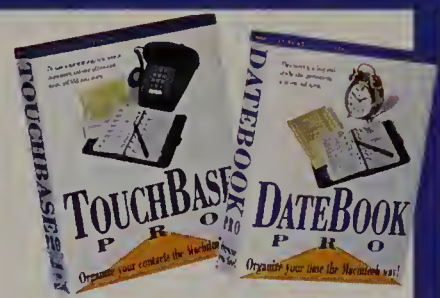


DATEBOOK PRO & TOUCHBASE PRO Bundle

POWERBOOK RECOMMENDED

DATEBOOK PRO and TOUCHBASE PRO are now totally integrated, and with this specially priced bundle, you save money while you save time. DATEBOOK PRO is a powerful calendar and time-management program. Calendaring, scheduling, to-do lists, and alarms combine to keep you informed. Print wall charts, custom schedules, or popular personal organizer formats to use when you're away from your Mac. TOUCHBASE PRO stores information about your personal and business contacts. Print Rolodex cards, address books, envelopes, and more. Create personalized letters using a built-in letter writer. Move from office to home without missing a beat. File synchronization updates records automatically.
(#5941, Aldus) ○

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.5, a hard drive or external floppy.

$288.

Supra Corporation

NEW!

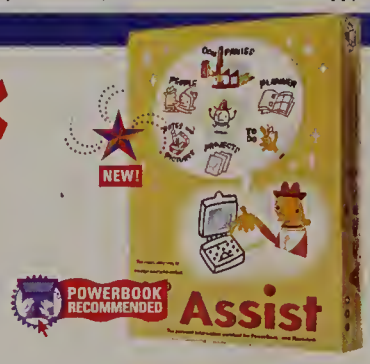
SupraFAXModem V.32bis MacPac & FaxMania Bundle

Get a top-of-the-line fax/data modem at an amazingly affordable price. The SupraFAXModem V.32bis MacPac features 14,400 bps data communications with up to 57,600 bps throughput using V.42bis data compression. On the fax side, you'll find yourself capable of sending and receiving faxes within minutes of installation. *MacUser* calls the V.32bis model a top performer. A special Silent Answer feature detects if an incoming call is fax or voice and handles the call appropriately. The MacPac also includes cables and fax software. Then, add fun to faxing with FaxMania, an imaginative, customizable collection of 80 electronic fax cover sheets. FaxMania works with popular word processing and graphics applications. (#4017/#6659, Supra/FaxMania) ○

Minimum requirements: Mac Plus, System 6.0.2.

$138.*

NEW!



POWERBOOK RECOMMENDED

Rae Assist

Rae Assist has everything you need to successfully manage your contacts, schedule, to do's, projects, notes, pictures, and other personal and business information. All your information is in one convenient and highly-integrated application. Freely tag and link information for easy retrieval. For example, you could list or find all entries that are tagged "clients" or "suppliers." Tags are fully customizable, and linking files keeps you organized. A built-in smart assistant helps you save time. Easily enter and import your data once, and start using it in multiple ways. Quickly find, sort, and print all your information. Ideal for the PowerBook. *MacUser* called it "The Super-PIM."
(#6624, Rae Technology, Inc.) ○

Minimum requirements: LC, 2MB RAM (2.5MB RAM recommended), System 6.0.7, 5MB hard disk space.

**Introductory price good through 8/31/93.*

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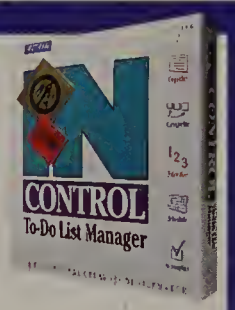
$82.



In Control 2.0

This is the new version of the 1992 Eddy Award winner. It's the only to-do list manager that lets you organize all your activities in an outline, a prioritized list, and on your calendar. So you choose what works best for you. Includes FREE DynoPage Lite which prints pages for Day-Timers, Day Runners, and other organizers.
(#5660, Attain) ○

Minimum requirements: Mac Plus, 512K RAM, System 6.0.7.

$164.

Payroll 5.0

Payroll is a stand-alone program that works with MultiLedger, Cash Ledger, or Teleware's M.Y.O.B. *Macworld* called it, "the best of all Mac payroll programs." (Nov. '90) It handles 401(k) plans, accrues vacation and sick hours, and prints on W-2s and 941s. It's a *Macworld* Editor's Choice and the most efficient payroll solution for your business.
(#5504, CheckMark) ○

Minimum requirements: Mac Plus, 1MB RAM, System 4.1.

$185.

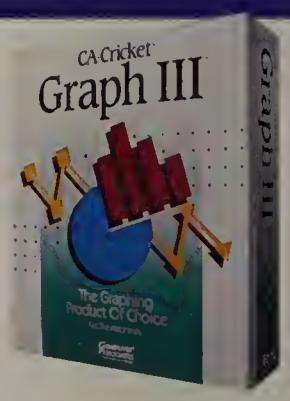
SoftPC Professional

Do the PC one better by bringing PC applications to your Mac! There's no need to add hardware. With SoftPC, software does it all. SoftPC Professional 3.0 emulates VGA graphics giving you 256 colors and increased monitor resolutions to show crisp, realistic, and vibrant graphics. It emulates an 80286 processor and an Intel 80287 math coprocessor. Run protected-mode MS-DOS applications which have been written to utilize extended memory. MS-DOS 5.0 is pre-installed. And Microsoft CD-ROM extensions are also included, which means that you can run PC CD-ROMs with your Mac CD-ROM drive. Plus, you can easily copy and paste text and graphics between PC and Mac applications.
(#5925, Insignia Solutions)

Minimum requirements: SE/30, 8MB RAM, System 6.0, 6MB hard drive space.

$99.

NEW!



Cricket Graph III 1.5

Convert text or data into a complete, professional-looking graph in seconds. Editing graphs is easy too – just double-click a graph component or other object, make your changes in the dialog box that appears, and view the results immediately. Import and graph data from word processors, databases, spreadsheets, or any program that produces files in TEXT, SYLK, JWKS, or WKS formats. Choose from scatter, line, stacked bar, pie, column, text, area, stacked column, double Y axes, bar, polar, quality control and overlay combinations. Customize graphs with 16 bar patterns, 48 plot symbols, six line styles, and five line widths.
(#6657, Computer Associates) ○

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.7, hard drive or second floppy drive, 2.5MB RAM under System 7.

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$124.

WordPerfect for Macintosh 2.1

Take advantage of all the latest System 7 technology by using WordPerfect to paste QuickTime movies into your documents and share data between applications with Publish & Subscribe. Or let nearly forty macros included in WordPerfect make it even simpler to address envelopes, and create tables, memos, bullets, circular text, and more. And you get Grammatik 5.1 FREE. It uses breakthrough technology to check spelling, grammar, and punctuation according to thirteen writing styles, three levels of formality, and 58 rules of style and grammar. A world-class word processor and the number one grammar checker integrate seamlessly into one powerful product with unparalleled features.
(#4111, WordPerfect) ○

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.3.

MAC'S PLACE EXCLUSIVE BUNDLE

$99.

Quicken 4.0 & Stacker Bundle

There are two basics every Mac user wants – more electronic storage space and a way to take advantage of their Mac to organize their finances. Get both with this month's bundle of Quicken 4.0 and Stacker for Macintosh. Quicken 4.0 is the latest version of the popular personal and small business finance program. Print and automatically address checks, update your check register, keep track of tax information, and print detailed reports. (Includes information on a $10 rebate for owners of previous versions of Quicken.) And Stacker's patented LZS data compression technology stores your data more efficiently without changing the way your Mac works – you just have double the disk space available. It's 100 percent compatible with all your applications.
(#6452/#6062, Intuit/Stac Electronics) ○

Minimum requirements: Mac Plus, 1 MB of RAM, and System 6.0.5.

$348.

MultiSpin 38 Portable CD-ROM Drive

Get our exclusive Mac's Place CD-ROM PowerKit FREE with a MultiSpin drive! NEC MultiSpin technology sets a new standard for speed. The MultiSpin 38 is the world's only double-spin, portable CD-ROM reader. And it's lightweight, has an optional battery pack, and accesses data at 400 ms. This drive delivers data up to a blazing 300K/sec., exceeding both QuickTime and Multimedia PC performance requirements. The increased throughput provides smooth-playing video and animation, and eliminates the waits once associated with CD-ROM computing. You'll also get up to $200 in rebates on CD-ROM software with the Mac's Place CD-ROM PowerKit.
(#6217, NEC)
$548. MultiSpin 74 CD-ROM Drive #6215

$298.

ACCURA 144+ Fax 144

Everything you need to send and receive data and Group 3 faxes is here. It's a V.32bis, 14.400 bps fax/data modem which also supports 9600, 2400, 1200, and 300 bps data, plus V.42/V.42bis and MNP 5 error-control and data compression. Get up to 57,000 bps throughput with V.42bis. Includes cables and fax software.
(Hayes, 6068)

Minimum requirements: Mac Plus, 1MB RAM.

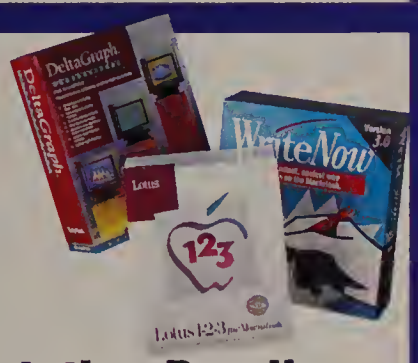
FREE OFFER!

$12.

Sony HD 3.5" 10-Pack

Get a free Sony audio or video tape when you buy a 10-Pack of Sony High-Density 3.5" Floppy Disks. That's right! Just send in the coupon included with your disks. Sony HD disks feature a full lifetime warranty and an exclusive magnetic particle formulation for unsurpassed performance. Offer expires June 30, 1994. Supply limited.
(#6655, Sony) ○

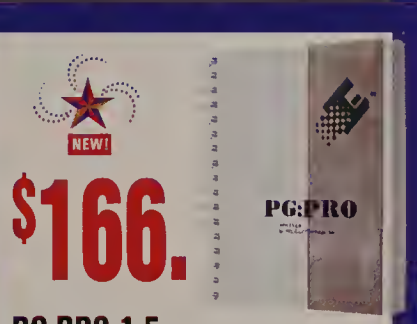
$138.



Lotus 1-2-3 Presentation Bundle

Get three best-selling business software packages (a $989 suggested retail value) for just $138! First, Lotus 1-2-3 for Macintosh lets you blast through any spreadsheet project with unmatched speed and ease-of-use. Only Lotus 1-2-3 offers in-cell editing. Another Lotus exclusive, true 3D worksheet allows you to consolidate up to 256 worksheets into a single file. Second, as a two-time winner of *MacUser's* Best New Word Processor award, WriteNow includes a 135,000-word spell checker, a 1.4 million word DA thesaurus, and powerful style sheets. And third, if you're not satisfied with your charts, DeltaGraph will give them new life. Choose from 120 types covering the full spectrum of business and scientific needs.
(#5964, Lotus Development/ T/Maker/ DeltaPoint)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.4, 3MB RAM under System 7.



$166.

PG:PRO 1.5

Macworld says, "Staz Software has produced the equivalent of an object-oriented programming (OOP) environment that doesn't require previous OOP experience." PG:PRO adds a graphical development interface to FutureBASIC and other object-oriented extensions. It lets you draw your interface and then generate the source code and resources necessary to recreate it.
(#5713, Staz Software)

Minimum requirements: Mac Plus, 1MB RAM, System 5.0.

$148.

FutureBASIC

"FutureBASIC is a complete, easy-to-learn, real-world programming tool," says *Macworld.* It has high-level, object-like extensions to the BASIC language for creating windows, menus, buttons, and even scrolling text-edit fields with a single statement. It also sports an in-line assembler, unrestricted access to the Mac toolbox, and the ability to compile virtually any kind of Mac code resource.
(#5647, Zedcor) ○

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.5, a hard drive.

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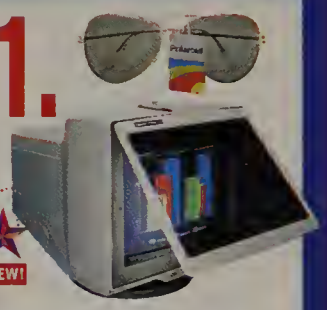
$36.

Yearn 2 Learn, Peanuts

Match wits with Snoopy and the Peanuts Gang. Kids can join in five fun activities as they learn and practice math, geography, reading, coloring, and Flying Aces games. Real voice narration, zany sounds, and the appearance of Charles Schulz' much-loved characters make this a program popular with kids of all ages. Increasing levels of skill keep games challenging but not difficult. (#5911, Image Smith)

Minimum requirements: Mac SE/30, 4MB RAM, System 6.0.7.

$31.



NEW!

Polaroid CP-60 9" Filter

See the difference in glare reduction and contrast enhancement when you install a Polaroid CP filter on your monitor. Circular polarizing (it traps up to 99 percent of the reflective light) sets this one apart from other filters. A special coating reduces static and eliminates up to 98 percent VLF/ELF radiation. Made of optical quality triacetate. **Buy now and get a pair of Polaroid sunglasses FREE ($16.95 value).** (#6660, Polaroid)

$24.

NEW!

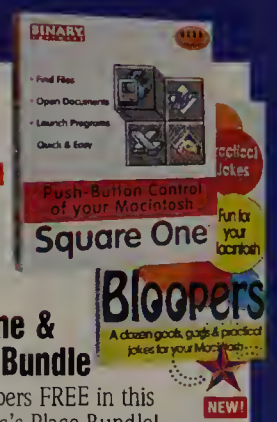
Wheel of Fortune

This all-new edition of Wheel of Fortune features Vanna White, the most popular game show hostess ever, and includes over 2,000 all-new puzzles. New and enhanced graphics along with improved game play bring you the most exciting version of America's favorite game show. Or try to deduce the right questions to Alex Trebek's answers in Jeopardy. (#6508, Gametek)

Minimum requirements: Mac Plus, 2.5MB RAM, System 7.

$24. Jeopardy with Alex Trebek #6513

$48.



NEW!

Square One & Bloopers Bundle

You get Bloopers FREE in this exclusive Mac's Place Bundle! Square One stores all of your favorite files in an easy-to-use icon palette. To access a file, just double click on its icon. Group several files into a single work-group icon and open them all at once. And Bloopers is full of fun sounds, gags, and practical jokes. Add oinks, moos, typewriter sounds, and more to any Mac. (#6625, Binary)

Minimum requirements: Mac Plus, 2MB RAM, System 7.

$68.

NEW!

7th Heaven & Ultimate Patterns Bundle

With 7th Heaven Utilities, System 7 becomes faster, more flexible, more informative, and easier to use. A collection of applications and installers (no INITs or CDEVs) lets you customize System 7 without the memory- and space-eating tendencies of the alternatives. FinderExpress uses the Finder to fast-file copy up to 120MB per minute. Informant lets you know your exact system configuration. Calendar, with stunning graphics, shows you one and three month views. And you get Chameleon Ultimate Patterns Vol. 1. It's the ultimate Mac desktop pattern utility. The finest collection of Mac desktop patterns, including Artbeats marble and tile patterns, are available in color, grayscale, and black and white. (#6649, Logical Solutions, Inc.) ○

Minimum requirements: Mac Plus, 2MB RAM, System 7, a hard drive. Color monitor recommended.

$110.

NEW!

Tempo II Plus 3.0

Automate your Mac with "intelligent" macros. Create hundreds of time-saving shortcuts, and simplify complex tasks. Tempo's "interactive" macros use conditional tests to determine how to format a document, when to back up your database, or which filters to apply in a "batch-process" task. Free phone dialer included! (#6534, Affinity Microsystems Ltd.) ○

Minimum requirements: Mac Plus, 1MB, System 6.0.2.

$34.

NEW!

Bridge 7.0

Bridge 7.0 is a complete bridge-playing program. You and your computer partner bid against two computer opponents and then play out the hand. Bidding is Standard American, five-card major and utilizes the Stayman and Blackwood conventions as well as weak or strong 2 bids. Many new features have been added to further refine this classic computer program. (#6545, Artworx)

Minimum requirements: Any Mac with 1MB RAM and an 800K drive.

$14. KaleidoKubes #6543

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- Mac's Place is open from 6 a.m. to 10 p.m. M-F Pacific Time, and 7 a.m. to 6 p.m. on Sat., 8 a.m. to 5 p.m. on Sun.
- No sales tax (except WA residents add 8.2%, OH residents add 6%, to total, including shipping).
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- Our $3 shipping charge includes insurance at no extra charge.
- When a partial order is shipped, we pay freight on additional shipments.
- Many products carry a money back gurarantee. Defective software is replaced immediately with like items. Defective hardware items repaired or replaced at our discretion. We reserve the right to revoke money back guarantee privileges.

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- Fax your order to 206-881-3090 for international orders.
- We ship throughout the free world via Airborne Express International.
- International orders will be charged full shipping rates.

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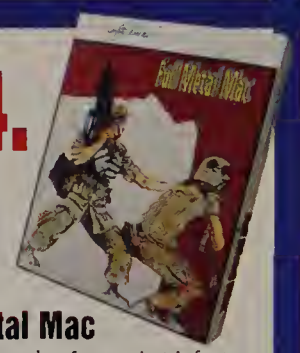
$24.



Full Metal Mac

Take on the role of a combat infantry officer in Full Metal Mac, a conflict simulation game. Play through sweat, fear, chaos, pressure, and the unpredictability of small arms infantry combat. Use M-16s, M-60s, LAW rockets, grenades and mortars, as well as hand-to-hand combat to defeat your enemy. Includes several maps for a variety of scenarios. One or two players. (#4528, Soft Wars)

Minimum requirements: Mac Plus, System 6.0.1, two 800K drives or a hard drive.

$39.

NEW!

Pathways into Darkness

Continuous-motion, 3D, texture mapped graphics have arrived on the Mac! You'll explore an ancient pyramid on your mission to save the world from a hostile alien demon. Explore miles of catacombs through a smooth scrolling, first-person interface. Beautifully rendered graphics and active panning stereo sound combine to make Pathways Into Darkness the closest thing to virtual reality without a helmet. (#6639, Bungie)

Minimum requirements: Any 256 or 8-bit color Mac, 2M8 RAM, System 6.0.5, 5MB hard disk space.

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- Delivery

Hard Drives

FUJITSU

Capacity	Description	Internal	External
520MB	3.5" HH 9ms	$690	$750
1200MB	***3.5" HH 9ms***	***$1,085***	***$1,145***
2000MB	5.25" FH 14ms	$1,899	$1,999
2400MB	5.25" FH 11.5ms	$2,075	$2,175

Fujitsu Drives carry a 5 year warranty

Quantum

Capacity	Description	Internal	External
80MB	2.5" Notebook 17ms	$269	$369
120MB	2.5" Notebook 17ms	$294	$394
42MB	3.5" LP 19ms	$164	$224
85MB	3.5" LP 17ms	$179	$239
127MB	3.5" LP 17ms	$204	$264
170MB	3.5" LP 17ms	$219	$279
240MB	3.5" LP 10ms	$304	$364
525MB	3.5" LP 10ms	$714	$774
425MB	3.5" HH 9ms	$684	$739
700MB	***3.5" HH 10ms***	***$894***	***$954***
1000MB	3.5" HH 10ms	$1,044	$1,104
1200MB	3.5" HH 10ms	$1,164	$1,224

Go Drives carry a 1 year warranty
The rest carry a 2 year warranty

CONNER

Capacity	Description	Internal	External
85MB	3.5" LP 17ms	$179	$239
120MB	3.5" LP 19ms	$219	$259
170MB	3.5" LP 17ms	$234	$294
212MB	***3.5" LP 12ms***	***$399***	***$499***
540MB	3.5" HH 8.5ms	$734	$794

Conner Drives carry a 1 year warranty

TOSHIBA

Capacity	Description	Internal	External
877MB	***3.5" HH 12.5ms***	***$1,019***	***$1,084***
1230MB	3.5" HH 12.5ms	$1,195	$1,245

Toshiba Drives carry a 3 year warranty

Seagate

Capacity	Description	Internal	External
1200MB	3.5" HH 10.5ms	$1,024	$1,059
1200MB	5.25" FH 15ms	$999	$1,059
1600MB	5.25" FH 15ms	$1,269	$1,369
2100MB	***5.25" FH 12.9ms***	***$1,619***	***$1,719***
1600MB	5.25" FH 11.5ms	$1,669	$1,769
2400MB	5.25" FH 11ms	$2,169	$2,239
3400MB	5.25" FH 11ms	$2,769	$2,869

Seagate Drives carry a 1 year warranty

Maxtor

Capacity	Description	Internal	External
120MB	3.5" LP 15ms	$194	$254
212MB	3.5" LP 15ms	$269	$329
345MB	3.5" HH 15ms	$494	$564
540MB	***3.5" HH 8.5ms***	***$894***	***$964***
1700MB	5.25" FH 13ms	$1,299	$1,399

Maxtor 3.5" Drives carry a 1 year warranty
5.25" Drives carry a 2 year warranty

MICROPOLIS

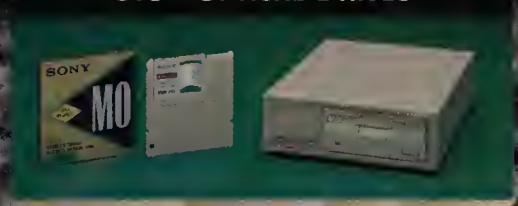
Capacity	Description	Internal	External
560MB	3.5" HH 10ms	$884	$944
1.2GB	3.5" HH 10ms	$1,044	$1,104
2.4GB	***5.25" FH 11.5ms***	***$2,284***	***$2,384***

Micropolis Drives carry a 5 year warranty
Includes Drive, Formatting SW, Cables, and Terminator.

Desktop Scanners

Model	Description	Price
MICROTEK		
Microtek 600ZS	24-bit Color, 600x300 dpi	$799
Microtek ScanMaker II	24-bit Color, 600x300 dpi	$829
Microtek ScanMaker IIxe	***24-bit Color, 600x300 dpi***	***$1,054***
Microtek ADF	For 600/Scanmaker II	$489
Transparency Adapter	For Scanmaker II/IIxe	$CALL
UMAX		
UMAX UC630	***24-bit Color, 600x300 dpi***	***$1,069***
UMAX UC840	24-bit Color, 800x400 dpi	$1,199
UMAX UC1200	24-bit Color, 1200x600 dpi	$2,899
Transparency Adapter	For All Models	$679

3.5" Optical Drives



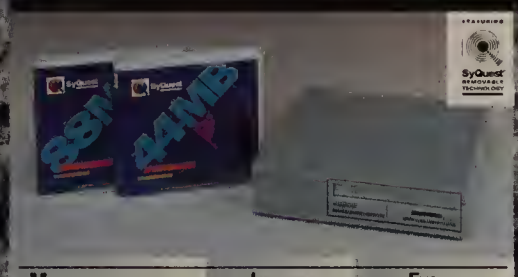
Model	Capacity	Seek	MacKit
Panasonic-128	***128mb***	***35ms***	***$855***
Fujitsu-128	128mb	30ms	$969
Sony-P301	128mb	35ms	$1,269
Most-256	128/256mb	37ms	$1,629

Includes external drive, 25/50 SCSI Cable, Mac SW, and Terminator

Cartridges

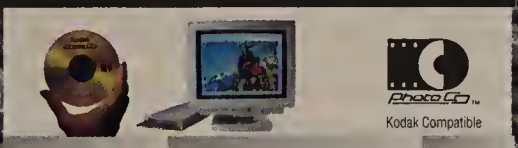
Sony 128mb as low as $45
Komag 128mb as low as ..$33

SyQuest Drives



Model	Internal	External
SyQuest 105	$559	$609
SyQuest 88C	***$429***	***$499***
SyQuest 88	$359	$409
SyQuest 44	***$249***	***$309***
Dual Drives		
SyQuest 88/44	N/A	$699
SyQuest 88/88	N/A	$799
SyQuest 44/44	N/A	$599
Cartridges		
105MB Cartridges (5+ or with drive Purchase)		$75.99
88MB Cartridges (5+ or with drive Purchase)		$89.99
44MB Cartridges (5+ or with drive Purchase)		***$59.99***

CD-ROM Drives



Kodak Compatible

Model	Description	MacKit
Texel	Multi Session/Dual Spin	$439
Toshiba 3301	Multi Session/Single Spin	$449
Toshiba 3401	***Multi Session/Dual Spin***	***$489***
Pioneer 600	6 Disc/Single Spin	$899
Pioneer 604	6 Disc/Dual Spin	$1,239
PM CDR	CO-ROM Recorder	$3,499

Includes external drive, 25/50 SCSI Cable, Mac SW, Caddy, and Terminator

5.25" Optical Drives

Model	Capacity	Seek	MacKit
Ricoh-9200EII	***594/650mb***	***66ms***	***$1,799***
Sony-E501	594/650mb	66ms	$1,949
Sony-E502	594/650mb	66ms	$2,049
Ricoh-9200EX	594/650mb	35ms	$2,249
MaxOptix-Tahiti II	***594/650/1gb***	***25ms***	***$2,799***
PMO-650	594/650mb	19*ms	$CALL
MaxOptix-Tahiti IIM	1gb/Worm	25ms	$2,999

Includes external drive, 25/50 SCSI Cable, Mac SW, and Terminator

Cartridges

Sony 594/650mb as low as $119
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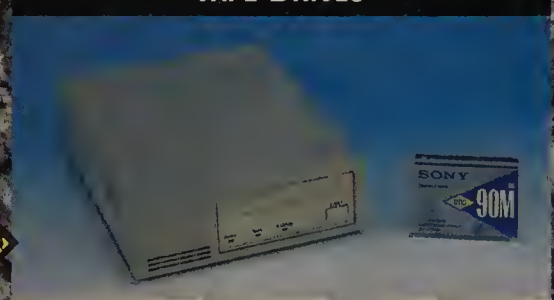
Tape Drives



Model	Capacity	Size	MacKit
Archive Viper 250	250MB`	3.5"HH	$499
Archive Viper 525	500MB	3.5"HH	$699
Sony SDT-2000	2Gbyte	3.5"HH	$1,299
Archive Python	***2 Gbyte***	***3.5"HH***	***$984***
Archive Turbo	2-8 Gbyte	3.5" HH	$1,329
HP 35470A	2Gbyte	3.5"HH	$1,349
HP 35480A	3-5Gbyte	3.5"HH	$1,549
Exabyte 8200	2Gbyte	5.25"FH	$1,899
Exabyte 8500	2Gbyte	5.25"FH	$2,899
Exabyte 8500C	5-10 Gbyte	5.25"FH	$2,999
Exabyte 8505	5-10Gbyte	5.25"HH	$3,399

Includes external drive, 25/50 SCSI Cable, MAC Sofbackup II, and Terminator
Retrospect 2.0: Add $75

Tapes

Sony DAT .....$22 Maxell 8mm $19

Printers

Model	Description	Price
Dataproducts		
LZR-960	***300dpi, 9ppm, RISC, 8.5x11***	***$1,099***
LZR-965	600dpi, 9ppm, RISC, 8.5x11	$1,799
LZR-1560, 1 Tray	400dpi, 15ppm, RISC, 11x17	$2,899
JOLT, Color	300dpi, 2ppm, Solid Ink, 8.5x11	$4,299
NewGen		
NewGen 660B	600dpi, 9ppm, RISC, 11x17	$3,899
NewGen 1200B	1200dpi, 9ppm, RISC, 11x17	$4,899

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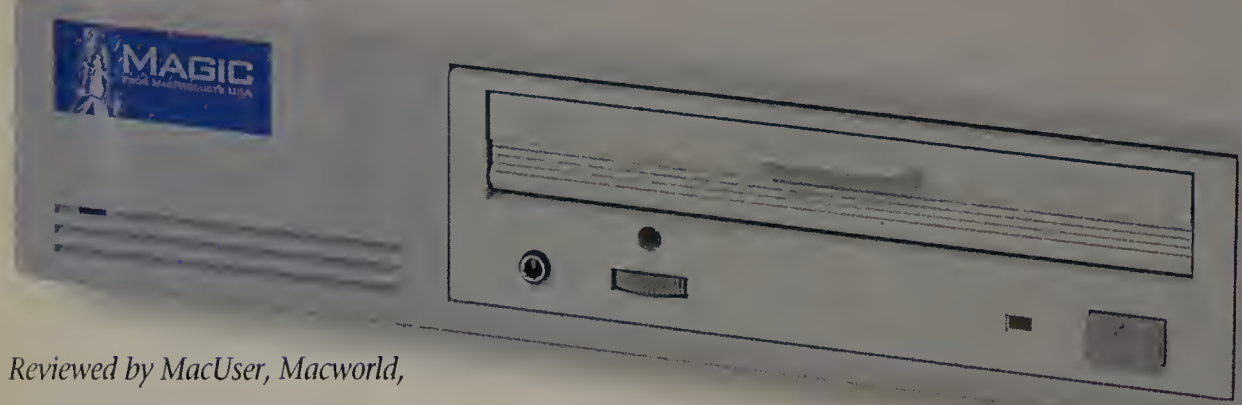

MacUser LABS Bottom Line Pick

Reviewed by MacUser, Macworld, MacWeek and PCWorld.

Magic CD-ROM

The award winning Magic CD-ROM has become one of our **hottest selling items - ever.** MacUser Labs was certainly pleased - so much so we were awarded their Bottom Line Pick in 1993. And now its even faster. Our multispin, multi-session PhotoCD compatible Toshiba drive is up to 5,000% faster than Apple's. And our new AllCache software caches directory, database, QuickTime, Finder and application usage.

Magic CD-Pro	$549
Magic CD-Pro w/6 Disk Bundle	$599
Apple CD-ROM AllCache Upgrade	$79
CD-ROM Encyclopedia	$49
The Journeymen	$59
Sherlock Holmes	$14
Art Beats	$275
Photodisc Sampler	$34

Also, call about our CD-ROM titles. We get new ones in every day, so check it out. ◆

Apple CD-ROM 300
Toshiba 3401 — 110% Faster
Magic CD-Pro — Up to 5,000% Faster

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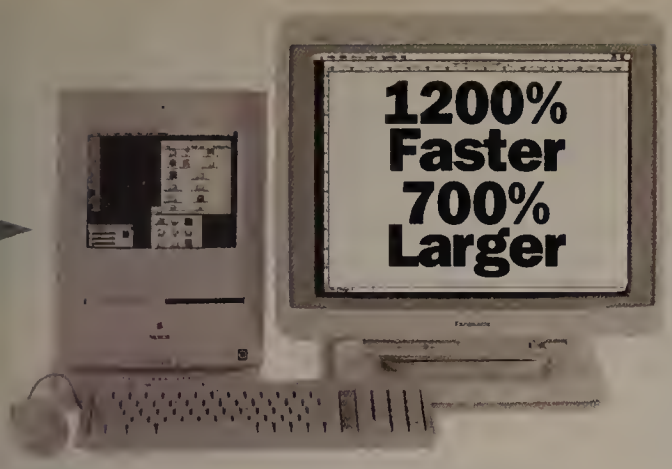

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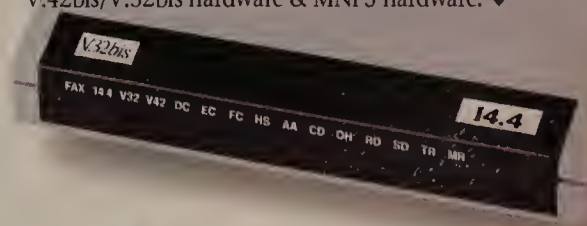

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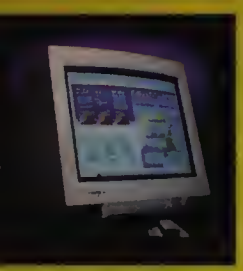

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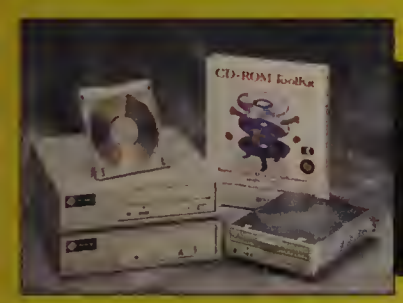

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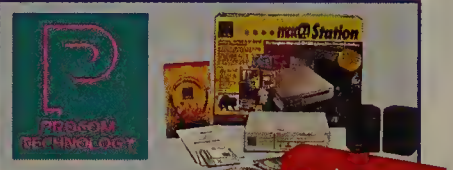

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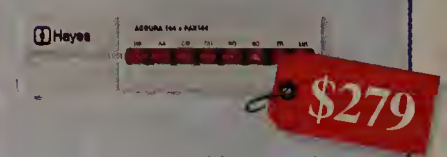

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1.2gig	3.5"	9ms	1089	1149
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2.2gig	5.25"	12ms	1589	1689*
2.4gig	5.25"	11ms	2039	2139
2.5gig	3.5"	8ms	2229	2289
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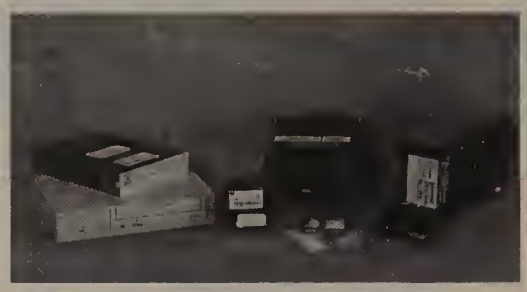

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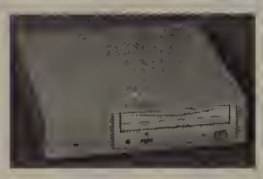

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1.3 - 8gig	ArchiveTurbo	4mm	1199	1259
1.3 - 2gig	Exabyte 4200	4mm	999	1059
1.3 - 5gig	Exabyte 8205	8mm	1506	1659
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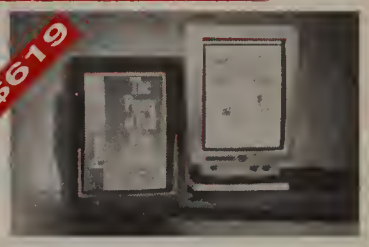

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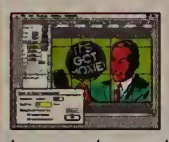

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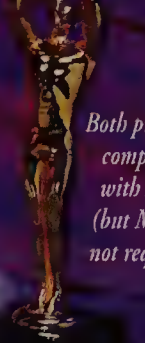

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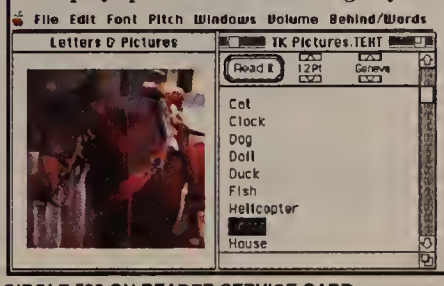

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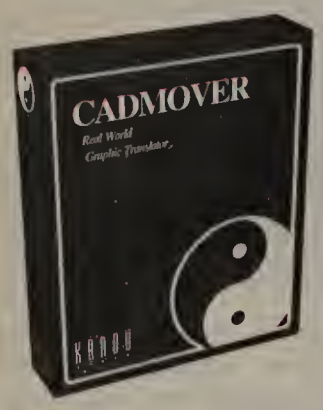

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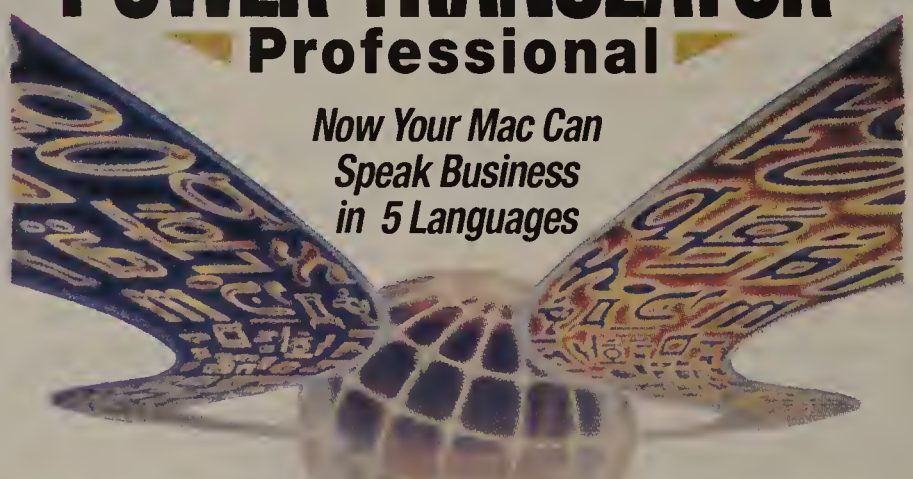

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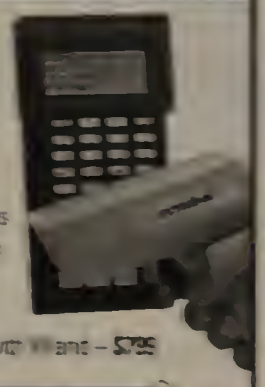

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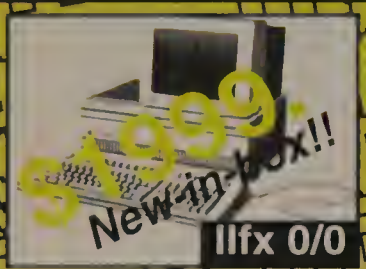

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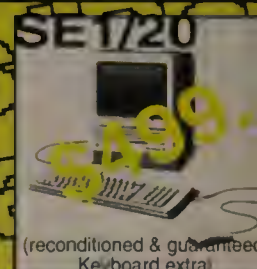

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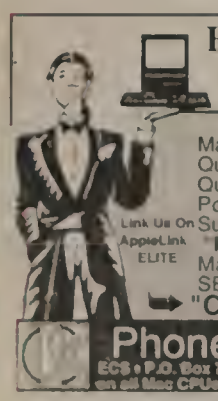

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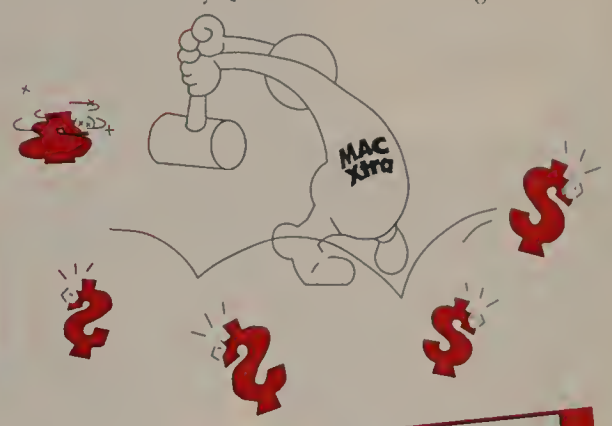

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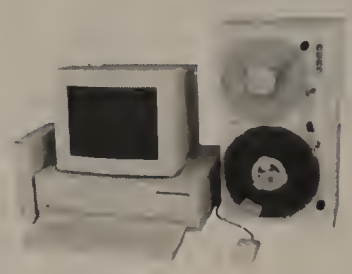

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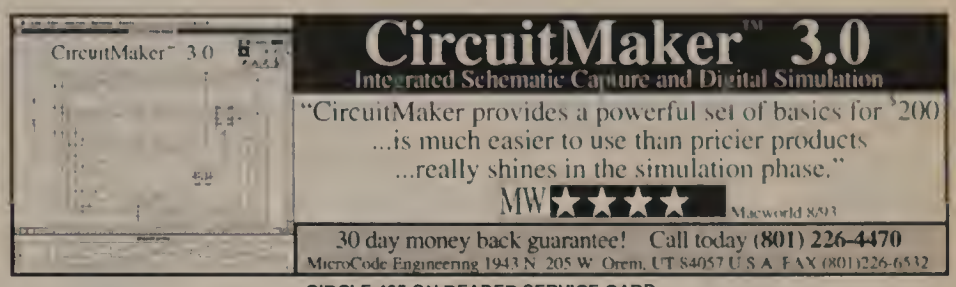

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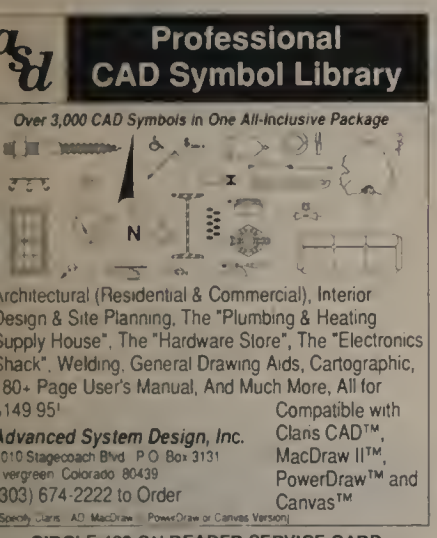

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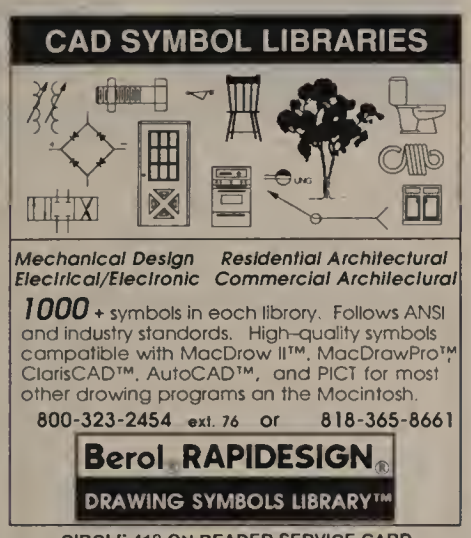

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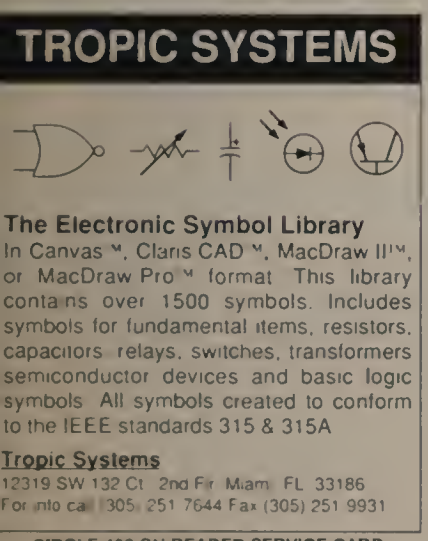

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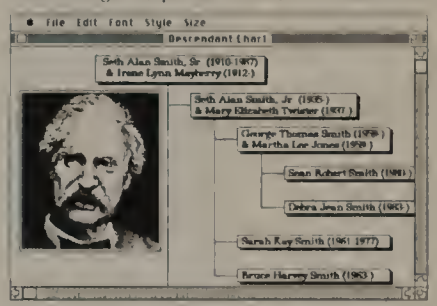

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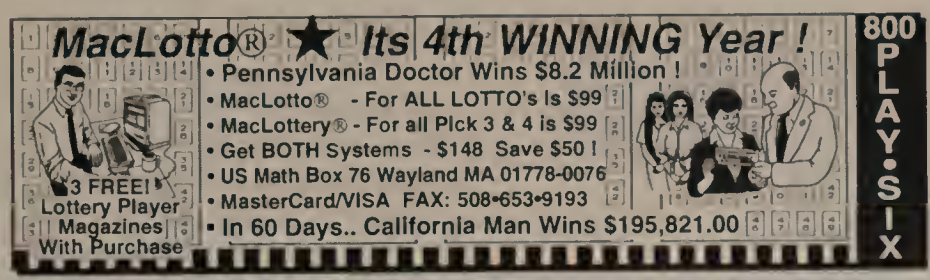

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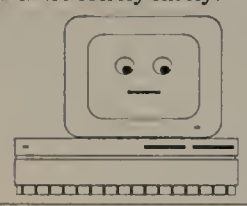

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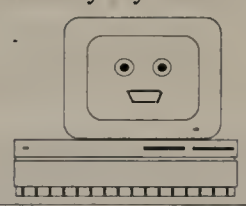

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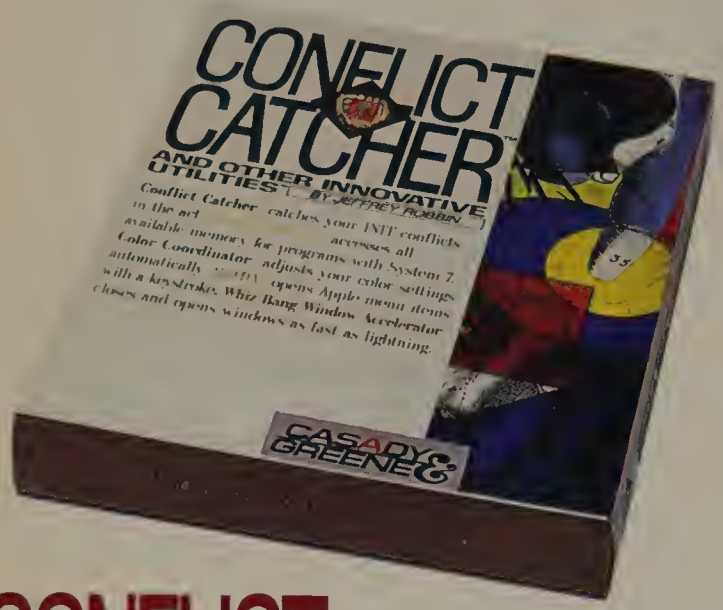

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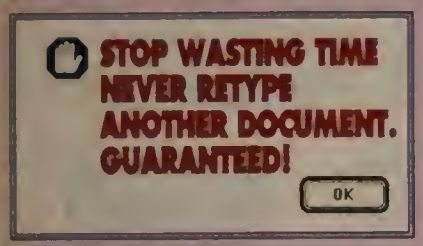

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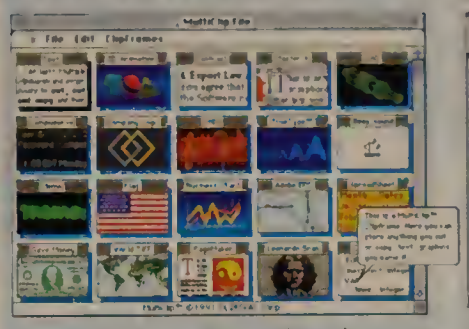

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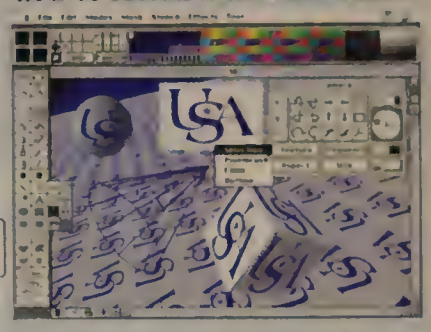

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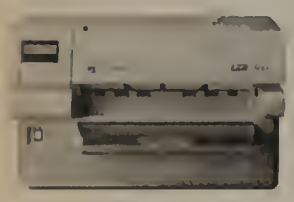

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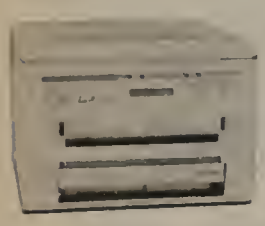

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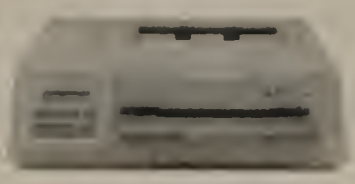

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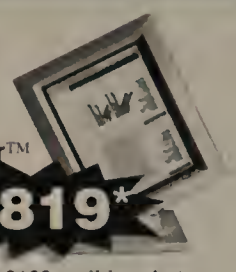

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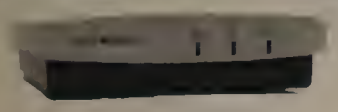

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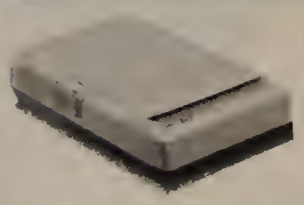

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WISE GUY

BY GUY KAWASAKI

The Goal of a New Machine

Give us a telephone with a computer; not the other way around

BY THE TIME YOU READ THIS column, the first wave of personal digital assistants (PDAs) will be hitting the streets. (Apple's Newton is shipping even as you read this.) PDAs were designed by the techno-best minds in the computer and electronics industry. They will be either the next wave of productivity enhancers or expensive Game Boys. I'll let other columnists criticize the usefulness of PDAs. Instead, I'll describe the kind of PDA I would use.

Achieving Nirvana

FOR A PDA TO BE ATTRACTIVE TO ME IT would have to replace one or more of the four most important things in my life: my wife, my PowerBook, my cellular telephone, or basketball. No PDA that I know of can do that; the first wave of PDAs are still computers—less functional than PowerBooks, albeit cooler and lighter. They were designed by computer dweebs for marketing dweebs. The PDA I want would be a telephone that's got a computer, not the other way around. It would replace my cellular phone and, for all but the heaviest writing, my PowerBook.

What's in a Name?

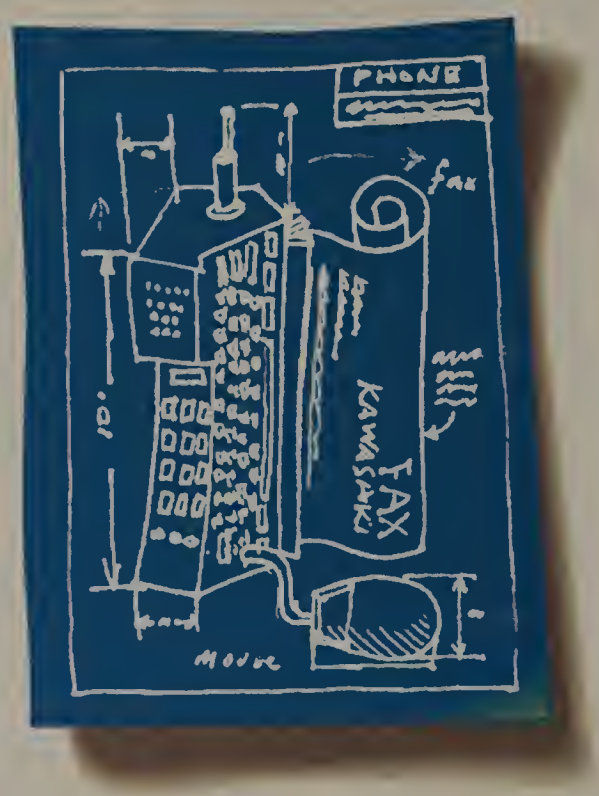
LET'S CALL THE GIZMO I WANT THE Personal Telephone Assistant, or PTA. At heart, it's a cellular telephone. I carry a cellular phone because almost anywhere, I can call and be called by almost anybody. At a conference, you see people waiting in line for telephones, right? Ever see people in line to use a computer?

The PTA should also have the functionality of a computer and fax so I can send and receive electronic mail and faxes. With incoming calls, it should answer, figure out if it's a fax or voice call, and then let me read the fax on the screen or talk to the caller, or switch to an answering-machine function. With an outgoing fax or E-mail, the PTA should send the call through the fax modem. If I'm making a phone call, the PTA should work like a cellular telephone: I pick up the phone and dial.

Spec Sheet

SO MUCH FOR FUNCTIONS; HERE ARE the hardware specs to make it a success.

- Size, 7 inches long (the smallest length possible for a usable keyboard), 4 inches wide, and 2.5 inches tall; weight, 3 pounds maximum
- An LCD display à la Sharp's Wizard (battery life is more important than readability for this product)
- A push-button light to illuminate the screen briefly, as with digital watches
- AC power, a cigarette-lighter adapter, and a rechargeable battery with 12-hour standby and 2-hour talk life (it should accept AA-size batteries in case you don't have a charged battery)
- A 14.4-Kbps fax modem



- A serial port to send and receive data files from a personal computer
- A trackmarble (as opposed to trackball) pointing device

Here's the point: the PTA is a wonderful telephone instead of a lousy computer. An LCD display on a computer is lousy. On a telephone with a keyboard, it's terrific. The glass is half full, not half empty.

Software Specs

THE PTA WOULD REQUIRE ONLY A FEW essential programs. You could add others, but the following should be bundled in.

- A calendar program
- A contact-management program
- Various E-mail programs (AppleLink, America Online, CompuServe) and terminal emulation
- A simple word processor

I should be able to search my contact-management program, find a person, and have the PTA dial that person or send E-mail or a fax.

This little wonder should cost about $1000. A cellular phone like the Motorola MicroTac costs about $500; a Sharp Wizard costs about $500; and a fax modem costs about $500. Some company should be able to squeeze out $500 to bring the total price to $1000.

This price is a little high, but I can rationalize spending $1000 because the PTA is a cellular phone—something I know I'll use—and for only $500 more, I get both a computer and a fax modem!

Initially, the best companies to build the PTA would be Hewlett-Packard or Motorola, or Hewlett-Packard *and* Motorola. HP has shown the ability to build something like this with its OmniBook 300. Motorola makes the MicroTac cellular phone—I rest my case. AT&T is a dark horse; it has the most to gain, but the company's distribution is pathetic.

So far, the PDA closest to the PTA is the EO 440 (owned by AT&T). It's a pen-based computer with a cellular phone and modem attached. But for me it is too large (about 8.5 by 11 inches), too expensive (about $4000), and lacks a keyboard. It is a pen-based computer with telephony, not a telephone with a computer.

Where Do I Send the Check?

MY PTA WOULD BE PRETTY EASY TO build and sell because all the components already exist, the channel is in place, and it's easy to explain. If someone from HP or Motorola is reading this, let me know where to send my check. Better, send me an evaluation unit, and I'll review it. **m**

GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. He has investments in Bit Jugglers, Objective Software, Global Village Communications, and Bookmaker Corporation. He is currently working on a book titled *Hindsights*

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